The Chemical Age

A Weekly Journal Devoted to Industrial & Engineering Chemistry

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Contents

NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Other communications relating to advertisements or general matters should be addressed to the Manager.

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Annual Reports on Applied Chemistry

IT may be said, without fear of contradiction, that of the literature published by the Society of Chemical Industry none exceeds, even if it equals, in value the annual volume of reports on the progress of applied chemistry. The Society decided on this series some four years ago, so that the volume which has recently made its appearance is No. 4 of what is already a most valuable library of references, the utility of which will appreciate as years go on. The task of collating information on all the more important branches of chemical technology is by no means an easy one, and the editor, Mr. T. F. Burton, deserves the fullest praise for the care and accuracy with which the volume has been prepared. As far as possible an endeavour is made to obtain a different authority to deal with each subject year by year. Thus, the reader finds in each new issue new interest in the particular reports which appeal to him; he does not always get the same point of view, and he feels, accordingly, that the expressions of opinion put forward are representative and unbiassed. The chemical industry as a whole, too, should be grateful to the individual contributors, for, in the majority of cases, they are men whose time is amply occupied, and who make, therefore, a certain sacrifice in order that the reports may be the most authoritative. Perhaps one of the most difficult tasks is that of preventing overlapping in the various sections. For instance, to consider three of them, namely, Fuel, Gas and Mineral Oils, it may well be imagined that there are facts which really belong to all three subjects, and reference to which might readily be made in all three reports. Mr. Burton overcomes any tendency to repetition by calling a meeting of all contributors prior to the writing of the reports. At this conference bounderies are defined, and contributors put in touch with one another so that each knows what the others are doing.

It is a matter for satisfaction to find that the volume is now obtainable earlier than formerly. It would be a great boon to the industry if publication could be speeded up even more, so that it would be available for perusal by March of the following year. We refrain for the moment from dealing with the actual material contained in the reports, in case we trespass on the preserves of our reviewer, whose notice will be published later. Meanwhile, it may be noted that THE CHEMICAL AGE appears for the first time among the publications quoted.

Billingham

THE announcement made this week respecting the future of Billingham discloses a business-like scheme which will be generally approved. Brunner, Mond & Co. have formed a new company, known as Synthetic Ammonia & Nitrates, Ltd., with a capital of £5,000,000, to take over from the Government the manufacture of nitrogen products from the air. We believe that at Billingham itself there is little to be disposed of except the site, a few foundations, some partly constructed roads, hutments, &c. The company, however, will have the great advantage of the research work carried on up to now, and will be able to make a fresh start under favourable conditions. They will—as we had reason to believe they would—take over the leading engineers and chemists employed by the Government in the research work on the subject, and, with these as a nucleus, have organised a staff of highly qualified scientists and technologists. They have also purchased the experimental plant of Dr. Maxted, whose valuable researches in this field are already familiar to our readers from his articles in THE CHEMICAL AGE. In addition to an exhaustive study of the present position of other synthetic processes the company's staff have themselves carried out a very thorough programme of research and design, and are now in a position to erect plant "in the full confidence that the process chosen will prove to be superior to any now in existence." The process decided on is essentially a

modification of the Haber process, and was worked out entirely without German assistance.

The company intend to erect at Billingham a plant for the manufacture of 100 tons of 100 per cent. ammonia per day, with provision for a rapid extension to 300 tons per day, equal to 150,000 (rising to 450,000) tons of sulphate per annum. Like the Cumberland Coal Power & Chemicals Co., they have decided that chloride of ammonia as a fertiliser is equal, if not superior, to sulphate of ammonia, and since by converting the ammonia into this form instead of into sulphate, carbonate of soda can be produced, they hope that the agricultural community will adopt chloride instead of sulphate. So far the scheme contemplates the production of nitrogen products for commercial purposes, but national necessity in the event of war has also been duly provided for. Arrangements have been made with Explosives Trades, Ltd., to take their requirements of ammonia from the company, and to erect plant to the extent desired by the Government for the oxidation of ammonia to form nitric acid and explosives derived therefrom. The scheme, as we have said, seems well planned to meet the country's needs, and with the resources of Brunner, Mond & Co. behind it we may count on the plans being well carried out.

Traders' Profits on Soda

ALLOWING for a little judicial rhetoric on the part of the chairman, it must be said frankly that some of the disclosures made before the Wholesale Complaints Tribunal of the Central Committee last week respecting trading transactions in soda were not very creditable. The first case was against May & Baker, Ltd., manufacturing chemists, Battersea, of offering washing soda at 15s. a cwt., while other firms were stated to be selling it at 7s. 6d., and the price fixed by Brunner, Mond & Co. and the United Alkali Co., was 5s. 6d. ex-wharf. The second was against Tinlings, Ltd., general produce merchants, of offering soda crystals at £15 a ton, against a market price of £5. 10s. The third was against J. Manger & Sons, Ltd, soda manufacturers, Kingsland, of charging 11s. for a cwt. of soda.

In the first case, that of May & Baker (as a letter from the manager in this issue explains), there appears to have been some misunderstanding as to the class of stuff the firm were quoting for. The Tribunal, however, refused to be convinced by the evidence on this point, for they not only held the complaint to be proved, but decided to refer the papers to the Public Prosecutor. They took a similar course on the second case, the chairman describing it as "as bad a case as any that has come before this Tribunal." In the third, that of J. Manger & Co., the Tribunal dismissed the appeal and pointedly complimented the firm on their "perfectly honourable dealing." The prices they had charged were found to be due to their having purchased from other firms to oblige customers, in some cases without making any profit for themselves. One of these, a Cardiff firm, attracted the particular attention of the Tribunal, who directed that the evidence concerning its trading should be referred to the Public Prosecutor. A representative of the firm in his evidence confessed that the soda was understood to be for export and he was under the impression that the Profiteering Act did not apply to export trade.

One satisfactory feature of the evidence was the proof it afforded of the integrity of the two great manufacturing concerns mentioned—Brunner, Mond & Co. and the United Alkali Co.—who, the Tribunal held, had honourably declined to take advantage of their position, and had maintained their normal prices both for soda ash and for household soda. The enormous inflation of prices was attributed, no doubt rightly, to outside gambling and speculation, and these proceedings under the Profiteering Act may serve as a wholesome check. The disclosures also point to the need of some representative organisation of chemical traders capable of imposing on all the high standard of integrity observed by the best firms.

British Dyestuffs

WE have not seen the present position of the British dyestuffs industry summed up more simply or with a nicer balance of merit and defect than it is by a writer in *Nature*. The great point in his case—and the one which dissatisfied critics so often overlook—is that "the time should not be far distant when British manufacturers will not only supply all requirements for the home market but also make their products known all over the world." If this is established, then the scheme which this country embarked on during the war for the production of the dyestuffs needed for its own use has already justified itself. This, however, does not mean that perfection has been attained, and it is well to have the defects to be made good quietly pointed out. The first of these is that the range and variety of our dyes are limited. According to a recent statement by Mr. Hoegger, had it not been for the importation of certain Swiss dyes during the war and the arrival recently of certain "reparation" colours from Germany, some of the branches of the British Cotton & Wool Dyers' Association would have been seriously embarrassed.

Then there is the occasional complaint of lack of uniformity, as regards shade or strength. "If," says the writer in *Nature* dealing with this matter, "the preparation of a dye has been properly worked out in the laboratory and in the small-scale plant (such as exists at Huddersfield), the large-scale manufacture should present few difficulties. Granted that the first few batches may leave something to be desired, succeeding batches made under careful scientific control should certainly be very close to the standard required, and the stock necessary to allow this difference to be adjusted should not be more than three or four batches—say, a ton at the utmost. With regard to the strength of the dye sent out, Mr. Hoegger states that a great proportion of the 25,000 tons is not so highly concentrated as were pre-war German colours. Almost every dye coming from the drying chamber is stronger than the standard, even taking as standard the German pre-war dye, and it is exceedingly bad policy to reduce the strength below it. This cannot be other than deliberate, and is very objectionable, as the quality of the dye is thereby depreciated in the mind of the user, and in this connection there is evidence that the Canadians are not altogether satisfied with the quality of the dyes imported from this country."

The answer to the question why we cannot make those dyes which are being imported from Switzerland and obtained from Germany is lack of plant and lack of raw material. With regard to the production of intermediate products there is still much to be done in both matters, especially in the construction of the special plants required. It must not, however, as the authority quoted points out, be concluded that British manufacturers have confined themselves to the dyes which are made with least trouble. Much useful work has been done by British firms, and there is little doubt that slow but steady progress is being made.

Substitutes for Petrol

EARLIER in the week reference was made in *The Times* to the experiments which Mr. George Shave, the chief engineer of the London General Omnibus Company, has been carrying out in connection with motor fuels. Even the optimists in this country have now given up hopes of ever obtaining a sufficiency of benzol, with the result that alcohol is more generally regarded as likely to provide the most readily obtainable substitute. Mr. Shave has recently been looking into the merits of a benzol-alcohol mixture. He found that with alcohol and benzol in equal proportions, a fuel was obtained which in efficiency, as compared with petrol, was as 12·5 is to 15. It was tried first in the workshop, with special reference to compression, carburettor setting, and heating of induction pipes, and the results were highly satisfactory. An interesting point was the analysis of the exhaust gases, which showed no unconsumed carbon monoxide. The mixture was next tested on the road in motor-omnibuses, and many stoppages took place that were traceable to choking of the carburettor jets and the formation of deposits in the induction pipes. Numerous mixtures of the two fuels were tested, with varying results, both in the shops and on the road, and while the 50 per cent. mixture was found to be the most satisfactory, its use somewhat impaired the engine. As to cost, this may be represented by the number of B.T.U.'s per penny produced by petrol (6,050), and by the 50 per cent. mixture (5,000). The cost per mile showed a difference in favour of the former of one-fifth of a penny. The mixture was found to be 12 per cent. more economical than petrol; the difference is 8 per cent. only in cost, petrol being the cheaper to use if the price per gallon of the two is the same. After further investigations and wider use of the benzol-alcohol mixture in equal proportions, results were obtained which showed that the mixture gave 6·05 miles to the gallon and petrol 7·19 with an economy of 2 per cent. in favour of benzol-alcohol on the B.T.U. basis of comparison. In better weather the mileage was naturally higher.

The salient points arising from the investigations already completed are that the possible thermal efficiency increases with the increased proportion of alcohol in the fuel for the same compression, that a high proportion of alcohol means also that the compression can be raised, with a consequent rise in the thermal efficiency; and that, so far as the engine is concerned, the bad effects on valve pockets are more marked at small throttle openings with high than with low compression. Another consideration has been to overcome the effect of the acid from the mixture on the pistons, and satisfactory use in this direction has been made of an addition to the mixture of ammonium nitrate. Further experiments are to be conducted with a mixture of alcohol and ether.

German Dyes in Spain

CONSIDERABLE satisfaction, we learn, is expressed in Germany over the new Spanish tariff rates for imported dyes which it is expected will shortly come into force, namely 4 pesetas per kilogramme for coal-tar colours and artificial dyes generally, and 2 pesetas per kilogramme for other colours. It is stated that these new rates will be a blow to the British dye export trade, and that the secretary of the British Chamber of Commerce at Barcelona has advised the British dye makers to try and get the Government to have them cancelled. It is further suggested that this step will hardly be successful since the British makers, in any case, do not produce the kind of dyes required in Spain. The German dye firms are strongly urged to take advantage of the position. According to the terms of the peace treaty Germany is bound to hold half her dye output at the disposal of the Allies, but this does not apply, it is argued, to the dyes manufactured by the Germans in foreign countries. If, then, the proposed tariff rates become law, the German chemists are advised to "modernise" the dye-works in Catalonia and bring them up to German standards. Presumably these works are already to a large extent in German hands, and it is anticipated that if they were brought up to date there would be excellent prospects of supplying dyes not only in Spain, but also in Portugal, Italy, the Near East, and even South America. German dye interests are counting on the British dye industry being severely handicapped by the high prices of its dyes. American dyes, according to German reports, have already ousted the British, whose prices for aniline dyes in Barcelona are said to be 30 per cent. higher than the American.

The Calendar

June		
11	Physical Society of London: Papers by Dr. T. Barratt and A. J. Scott; J. S. G. Thomas; L. F. Richardson; J. W. T. Walsh. 5 p.m.	Imperial College of Science, South Kensington, London.
12	Biochemical Society: 4.30 p.m.	Experimental Station, Wisley, Surrey.
14	Society of Chemical Industry: Annual Meeting. 5 p.m.	Central House, Finsbury Sq., London.
14	Faraday Society.	Chemical Society, Burlington House,
15	London University: "Biochemistry of Sterols," by Mr. J. H. Gardner. 5 p.m.	Physical Laboratory, South Kensington, London.
15	Mineralogical Society: Papers by F. P. Monnell, Professor R. Ohashi, W. A. Richardson. 5.30 p.m.	
16	Royal Meteorological Society: Papers by W. H. Dines, Dr. S. Chapman, and E. A. Milne. 5 p.m.	Burlington House, Piccadilly, London.
16	Society of Glass Technology: Special General Meeting. 2.15 p.m.	The University Sheffield.
17	Chemical Society: "Helium," by Professor J. C. McLennan. 8 p.m.	Institution of Mechanical Engineers, Burlington House, Piccadilly.
17	Chemical Society: Lecture by Prof. J. C. McLennan. 8 p.m.	
24	Oil and Colour Chemists' Association. 7.30 p.m.	Food Reform Club, 2, Furnival Street, London.
28	"Emploi des metaux ammoniums en Chimie Organique," by Professor P. Lebeau. 5 p.m.	King's College, Strand, London.
30	"L'Œuvre Scientifique d' Henri Moissan," by Professor P. Lebeau. 5 p.m.	King's College, Strand, London.

Moisture in Sulphate of Ammonia

By J. T. Sheard

In the following article (which we reproduce from to-day's issue of "The Gas World") the writer discusses the question of the acquisition and retention of moisture by sulphate of ammonia. Mr. Sheard, who has patented a process for the making of neutral salt by a simple and inexpensive method, gives the results of experiments designed to test the theory that the tendency of sulphate to retain and absorb moisture is a measure of the free acid which it contains.

THE behaviour of sulphate of ammonia with regard to the acquisition and retention of moisture is a matter of some practical importance, because of its effect both on the physical character of the salt and on the material of the packages in which it is contained. It is generally assumed that the tendency of sulphate to retain the moisture with which it leaves the factory and its readiness to absorb further moisture from the air are a measure of the free acid which it contains. Thus in a circular issued not very long ago by the Sulphate of Ammonia Association, it was stated that "free acid tends to attract moisture, and it is therefore only possible to dry sulphate containing practically no free acid."

EXPERIMENT I.

Sulphate of Ammonia containing 0·50 per cent. Free Acid.

Exposure. Hours.	Weather during the period.	Moisture contained per cent.
	At starting	3·5
20	Dry	1·0
44	Damp	2·5
68	Dry	1·7
90	Raining	3·5
140	Damp	5·9
164	Do.	4·2
188	Dry—Sunny	2·1
210	Do.	·3
260	Do.	·3

Dust collected over the period = 0·6 per cent.

Tests made in the laboratory, in which sulphate was exposed over water in a bell jar, and therefore to an atmosphere constantly saturated with aqueous vapour, showed that, whether the salt contained free acid or was made neutral with ammonia, it absorbed moisture to a large and continually increasing amount. It was recognised, however, that these were artificial conditions, not representative of actual experience, and therefore experiments were carried out in the open as follows:—For each experiment a quantity of from 500 to 1,000 grains of sulphate was weighed on a clock glass, which was then freely exposed to the atmosphere. The exposure took place at a height of 18 ft. above ground level, on the floor of a well-roofed shed, open on all sides. Some slight protection was afforded from the direct action of wind blowing on to the sulphate; otherwise there was free exposure of the material to the air. At intervals the sulphate was carefully weighed, and the gain or loss in weight noted.

EXPERIMENT II.

Sulphate of Ammonia containing 0·16 per cent. Free Acid.

Exposure. Hours.	Weather during the period.	Moisture contained per cent.
	At starting	·4
48	Fine—Bright	·2
90	Dull	·6
140	Dull to Fine	·1
210	Fair to Damp	·4
259	Damp to Fair	·6
330	Dull, with some Showers	·7
380	Do.	·9
498	Fine—Warm	·3
593	Fair to Showery...	·5
666	Showery to Fair...	·7
740	Fair, with some Showers	·6
810	Do.	·8
880	Showery to Damp	2·1
980	Fair	·7

Dust collected over the period = 1·8 per cent.

As dust collected on the material exposed, as well as moisture, this had to be allowed for, which was done as follows:—At the end of the exposure the sulphate was thoroughly dried in the oven, and afterwards dissolved in water, and the insoluble matter, which consisted chiefly of coal and coke dust, filtered off, dried and weighed. By calculation from this weight suitable deductions were made from the periodical weighings, on the assumption that the dust had been collecting regularly throughout the period.

In the solution the total amount of contained ammonia was determined, in order to make sure that no sulphate had been lost during the exposure. The amount of free acid, if any, was also determined, to show that this remained the same at the end as at the beginning of the experiment (in Experiment II. it was very slightly higher).

EXPERIMENT III.

Sulphate of Ammonia containing *no* Free Acid.

Exposure. Hours.	Weather during the period.	Moisture contained per cent.
	At starting	·1
48	Dull	·3
124	Fair	·3
172	Showery to Damp	2·3
288	Wet	3·3
358	Stormy—Snow and Rain*	13·3
385	Dull to Fair	8·5
408	Fair to Dull	6·8
454	Fair	4·9
480	Do.	3·5
533	Snow and Rain	9·3
575	Snow to Fair	8·4

Dust collected over the period = 0·9 per cent.

The detailed results of the experiments, given above, show that sulphate of ammonia, whether containing 0·50 per cent. of free acid, 0·16 per cent., or no free acid whatever, absorbs moisture from a damp atmosphere and gives it up to a dry one. The salt, indeed, acts as a very sensitive indicator of the hygroscopic state of the atmosphere to which it is exposed.

In a paper read before the American Chemical Society, by Atwater and Schulze, last year, it was sought to prove that the caking of sulphate of ammonia is due to pyridine, existing in the salt in the form of pyridine sulphate, and as caking is a phenomenon associated with the action of moisture, it seemed advisable to make further experiments in order to test this theory. The American authors' experiments showed how such pyridine might easily be driven off and replaced by ammonia, and they contended that when this was done the salt would not absorb an appreciable amount of moisture from the air, while its caking would be negligible.

A sample of good white sulphate, containing 25·7 per cent. ammonia and 0·2 per cent. free sulphuric acid, was therefore taken and pure ammonia driven through it for some hours, until the salt became quite brown, by reason of the precipitation of the trace of iron contained in it, showing that the material was over-neutralsed. According to the American authors, no pyridine could remain in sulphate so treated. The salt was then dried in the water oven and exposed to the atmosphere exactly as in the examples described above. Much finer weather prevailed during this period than at the time of Experiment III., but, as will be seen, the results obtained as regards absorption and liberation of moisture differed only in degree and not in kind from those of the former experiment. And, further, when the neutralised sulphate, which had absorbed several per cent. of moisture, became dry again, it was found to be caked together on the surface, just as was the case with sulphate containing a little free sulphuric acid.

EXPERIMENT IV.

Sulphate of Ammonia neutralised by means of Ammonia.

Exposure. Hours.	Weather during the period.	Moisture contained per cent.
	At starting	Nil
48	Fair—Some slight Showers	·2
90	Dull—Some Showers	·6
138	Rainy to Fair	2·6
188	Fine, with Strong Winds	·4
217	Some slight Showers	·5
337	Fine—Warm	·1
354	Some Showers	2·7
426	Fine	·3

Dust collected over the period = 1·1 per cent.

* During this period it is probable that some drifting snow actually fell on the sulphate.

It is therefore clearly established by the foregoing experiments—first, that sulphate containing so much as 0·50 per cent. of free acid can be dried by simple exposure to the air, without any application of heat, until it contains no more than 0·3 per cent. of moisture, and to as low as 0·1 per cent. when containing 0·16 per cent. of free acid; secondly, that sulphate, whether it be neutral or contain free acid, absorbs moisture to an unlimited extent when exposed to a damp atmosphere; and thirdly, that dry sulphate, whether neutral or not, which is allowed to absorb moisture cakes together on drying again. The caking is not so pronounced with neutralised salt, because the film of amorphous ferric hydrate which is precipitated on the surface of the crystals prevents these latter adhering together. Any similar inert material would act in the same way. The most beneficial to employ is a finely powdered phosphatic material, such as bone meal, which, besides serving the purpose required, is itself a not useless ingredient in the sulphate, when applied as a fertilizer.

Another and not unimportant matter arises out of this investigation. If it makes hardly any difference, as regards the reaction of sulphate to a moist atmosphere, whether the salt contains 0·5 per cent. of free acid or is neutral even to the verge of alkalinity, one is led to question the wisdom of a policy which subsidizes the production of so neutralised salt. All industrial sulphuric acid contains a trace of iron, which, in the manufacture of sulphate, is transferred to the salt; and if the latter be made even very slightly alkaline (which, by the method of neutralising with added ammonia, it is scarcely possible to avoid), some of the iron is precipitated on the salt and gives it an objectionable brown stain. Not only is sulphate so treated much less pleasing in appearance, but there is reason to suppose that its real value as a fertiliser is lessened. It is generally admitted that iron is one of several elements existing in minute quantity in fertile soil, which, formerly supposed to be mere inert ingredients, are now recognised as a necessity for the perfect development of plant life. If such be the case, then it is surely better that the trace of iron contained in commercial sulphate of ammonia should be presented to the soil in the form of a soluble sulphate than as unassimilable ferric oxide.

Standardisation of Scientific Apparatus

THE economy and advantage of the standardisation of laboratory fittings suggested recently by Mr. Alan E. Munby to the Department of Scientific and Industrial Research, and again urged in the columns of *Nature* last month have been realised in America by the Association of Scientific Apparatus manufacturers, who, through its committee on Standardisation of Apparatus, has decided to take this important step. It is pointed out that standardisation by all the manufacturers working together will have many other advantages besides making it possible to carry in stock all the listed equipment. It makes very little difference to the laboratory man whether a 400-c.c. flask is fitted by a number 5 or a number 7 rubber stopper, but he will appreciate it greatly if all makers will produce the same size flask with the same size neck so that when one is broken it may be replaced by another that may have been purchased from a different dealer without the necessity of using a different sized stopper in the apparatus. This interchangeability, though not vital, is, it is stated, of sufficient importance to justify considerable expenditure by the makers of glassware, whether blown or moulded, to get together upon a common basis of size and style. Temporarily, the cost will be appreciable, but ultimately the gain to all parties concerned will far offset this temporary financial burden. It is hoped that the Association of Apparatus Manufacturers and the American Chemical Society committees jointly will be able to make raipd progress in this undertaking.

More Sodium Sulphate Located in Saskatchewan

ANOTHER deposit of natural salt has been located in Southern Saskatchewan which, on analysis, shows from 98 to 99 per cent. of sodium sulphate, with a slight trace of common salt and potash. The deposit is situated in townships 4, R. 21, W. 2nd, and lies in the form of a lake bed about four miles in length, and from 200 to 900 yards wide. Drilling has been carried on, so far, to a depth of 16 ft. The deposit is, apparently, something similar to the one at Muskiki Lake.

Industrial Chemists

More Attention needed to Economic Reforms

AT the general meeting of the Newcastle Association of Industrial Chemists on Saturday, June 5, at Newcastle, an interesting address was given by Mr. W. R. Hailes on the work and aims of the Association, in which he stated that they had not yet attained a membership sufficient to say they really represented works chemists.

Dealing with the objects of the Association, Mr. Hailes said its first fault was a vagueness of purpose. By registering as a Trade Union they were bound to find a definite programme—an attitude which implied a definite relationship between employers and employed. "The chemist's work," he said, "requires painstaking attention to detail, involves a monotonous routine and a measure of responsibility. He works in an atmosphere which is most unhealthy; his work is frequently dangerous; his clothing is injured and torn by reagents, and his recompense is inadequate, and his general position precarious. If he is not wanted as a chemist his studies find him no other sphere of work. . . . We want recognition for the chemist as a skilled worker, a wage sufficient for his needs, and laboratories built as such, with proper and efficient appliances; we want some system which will ensure a supply of skilled men instead of the crowds of boys and 'testers' with which our laboratories are filled. We want to be able to close our doors to druggists and school teachers who have failed."

Mr. Hailes objected to the custom of reading only technical papers at their meetings, and contended that there were sufficient societies existing for that branch of the industry. He held that, for the moment, it was more important, as an Association, that they should deal solely with matters relating to the conditions and salaries of the members. His suggestions of subjects for discussion included (1) "The apprentice system as applied to works chemists"; (2) "The 'tester': how to eliminate him"; (3) The possibilities of works chemistry as a career"; (4) "Trades unionism"; (5) "Labour councils and works chemists"; and (6) "Working hours and salaries."

A good discussion followed the address, and several members paid a tribute to the work of the local officials.

Society of Chemical Industry

THROUGH the kindness of the Institute of Chemistry and in co-operation with them, the final meeting of the session of the London Section of the Society of Chemical Industry took the form of an informal meeting with some exhibits of plant and apparatus of interest to chemists, in the rooms of the Institute of Chemistry, Russell Square, on Monday, June 7. There were no formal proceedings. Some 18 firms sent exhibits, which included chemical glassware by the Scientific Supplies Co., Ltd., specimens of Dr. Lessing's contact rings for gas scrubbing towers, Vitreosil heat resisting ware by the Thermal Syndicate, Ltd., chemicals by British Drug Houses, Ltd., Boake, Roberts & Co., and W. J. Bush & Co., cast iron acid resisting enamelled chemical plant, by T. & G. Clark & Co., aluminium chemical plant by the Aluminium Plant and Vessel Co., the Pfeiffer gas testing apparatus, sent by Dr. C. A. Keane, drawings of the Kestner single effect evaporator, and instruments by the Cambridge Scientific Instrument Co., and Adam Hilger & Co. There was also a demonstration of the Sheringham artificial daylight for colour matching.

Birmingham Section's Visit to Dunlop Works

THE Birmingham and Midland Section of the Society of Chemical Industry is following the lead of other technical societies and taking advantage of the opportunity of visiting works. On Thursday, June 3, a representative company of Midland chemists, with many student chemists from the University of Birmingham, paid a visit to the new works of the Dunlop Rubber Company, Fort Dunlop, Birmingham. The visitors were entertained to tea, and afterwards the various departments of the works, which have been arranged on a most scientific basis for mass production, were inspected. The fine chemical and physical laboratories naturally made a strong appeal. The visitors, who were conducted by Dr. Twiss, chief chemist, and members of his staff, included Dr. R. S. Morrell, vice-chairman of the Society, Mr. F. R. O'Shaughnessy, Mr. T. F. E. Rhead, Dr. Tripp (London) and many others.

Complaints of Profiteering in Soda

Searching Inquiry Before the Wholesale Complaints Tribunal

(Specially Reported for "The Chemical Age")

As will be seen from the following reports, the Wholesale Complaints Tribunal of the Central Committee were occupied on Thursday and Saturday of last week in investigating complaints of profiteering in soda against three chemical firms. In two cases the Tribunal not only he'd the complaints to be justified but decided to refer the papers to the Public Prosecutor; in the third the complaints against the respondent firm were dismissed. In announcing these decisions the Chairman commented in severe terms, on what he described as the "epidemic of profiteering" and a "wide-spread gambling conspiracy."

The Case of May & Baker, Ltd.

The first case investigated was brought by the General Bottle Company of 78, St. Agnes Place, Kennington, S.E., who stated that they were offered washing soda at 15s. a cwt. by May & Baker, Ltd., manufacturing chemists, of Battersea. Other firms, they alleged, were selling washing soda at 7s. 2d. per cwt., delivered, while Brunner, Mond & Co., Ltd., and the United Alkali Co. had fixed their price at 5s. 6d. per cwt., ex-wharf. Mr. E. E. Boys, a partner in the General Bottle Co., said they were not making any complaint, but were simply bringing the facts forward for investigation.

The Chairman: The case is sent here by the Profiteering Committee of the Battersea Borough Council.

Mr. Boys said that in January his firm were offered washing soda by the respondents, and on January 30 May & Baker sent them a *pro forma* invoice for 3 cwts. of soda at 15s. a cwt., while 3s. was charged for two sacks, but they did not purchase any of the soda from the respondents. The complainants had on Dec. 22 purchased washing soda from D. Rose, Ltd., at 14s. 3d. for 2 cwts., while nothing was charged for the sacks.

Board of Trade Evidence

Mr. J. F. Ronca, principal staff officer in the Department of Industries and Manufactures, stated that between December 20 and the end of January last there was a world shortage of soda ash, and there was likely to be a world shortage for some little time. Soda ash was required in numerous industries, including the soap, glass, and textile industries. A certain quantity was required for household purposes in the form of soda crystals. Because of the shortage and because manufacturers could not supply the full demand, there was competition between the big industries of the country who wanted soda ash, and the other consumers. Amongst those "other consumers" were the householders who wanted soda crystals. It was felt that the housewife could better stand that shortage than the manufacturer. If the latter experienced any shortage it would mean unemployment, and a shortage in other goods. There had been indications that some lots of soda were being bought up and dealt in at fairly high prices.

The Chariman: Dealt in by speculators?

Mr. Ronca: Yes, more than by manufacturers. There are two big groups of manufacturers producing soda ash. In addition there are, in peace times, a number of smaller firms who buy soda ash and recrystallise it.

The Chairman: Do these smaller firms buy from the big groups?

Mr. Ronca: Yes, they get soda ash, add water and let it recrystallise. There are also other firms who use soda ash for making refined products. The Board of Trade have been asked by users and grocers' associations to take steps in order to ensure that bigger supplies are available on the home market, and that less is exported. In that connection it has to be remembered that although export is taking place, it is nothing like what it was before the war. The increase in exports of one of the big groups is very much less than the increase in the quantity which that concern have put on the home market. There is now a largely increased demand for soda, owing possibly to the increased activity in various manufacturers who consume chemicals.

The Chairman: Have the Board of Trade found those two big groups of manufacturers willing to co-operate in limiting exports?

Mr. Ronca: They have done everything possible. One of the two big groups has told buyers who wanted to purchase for export that they would not supply unless a chit was first obtained from the Board of Trade allowing the export. In 1913 exports of soda from this country were three million cwts., while in 1915 the figures rose to 4½ million cwts. Last year the exports dropped to 3,300,000 cwts.

Evidence by Brunner, Mond and the United Alkali Co.

Mr. G. Butler, sales manager to Brunner, Mond & Co., Northwich, agreed that his employers were the centre of one of the great groups of alkali manufacturers.

The Chairman: Are you associated with the United Alkali Co., or do they represent the other group?

Witness: We do not associate with them. They are competing manufacturers.

Are there any others besides these two groups of big manufacturers? I do not know of any others.

The witness said that there were a number of small manufacturers who purchased soda ash from the big groups, dissolved it, and then recrystallised it in order to make washing soda. A ton of soda ash would produce about 3 tons of washing soda. The price of washing soda was now £5 10s. a ton. The price had not been varied for some time, but that of soda ash was advanced some little time ago by 10s. a ton to meet the increased railway charges.

The chairman asked if Brunner, Mond & Co. had experienced any difficulties in obtaining supplies of raw materials, and the witness replied in the affirmative.

A question was asked as to whether supplies of raw material were more difficult to obtain now than during the war, and the reply was that the position did not seem to be improving. As a result of the difficulty in obtaining raw materials Brunner, Mond & Co. could not meet all the demands made upon them. They could produce more soda if the supply of raw materials was better. They could also sell more if the production were increased. His firm had adopted a system of rationing their customers.

The chairman: Your firm have co-operated with the Board of Trade in the matter of export?

Witness: We have absolutely ceased to export all washing soda since the middle of March. We have not accepted a single order for soda crystals for export from this country.

Mr. C. S. Arthur, London sales manager to the United Alkali Co., agreed with the evidence of the last witness,

The chairman said that Mr. Bromfield, the Secretary of the British Chemical Trade Association, had attended to give evidence, but could not give any further information on the matter.

The Respondents' Case

Mr. H. Crimp, sales manager to the respondents, said he quoted the complainants 15s. a cwt. for soda. He told the complainants that they had only pure crystals to offer. The soda they were offering was "sodium carbonate crystals B.P."

The chairman pointed out that the *pro forma* invoice issued by the respondents referred to washing soda, and suggested that when the complainants asked for washing soda they should have been told that May & Baker, Ltd., only made pharmaceutical preparations.

Mr. W. G. Hyde, a director of the respondent company, said that there were two or three different kinds of washing soda. The latter was a general term for carbonate of soda, and covered all qualities. The respondents purchased 58 per cent. alkali from Brunner, Mond & Co., and treated it themselves.

The chairman: Do you generally sell your product as washing soda?

Witness: No, very few people ask us for it. Their pre-war selling price of the product was £10 a ton at the works. The cost of manufacture in 1914 was £4 15s. a ton, and it now cost £10 4s. 9d. a ton to produce. The present selling price was £15 a ton, delivered, and it was estimated that the cost of delivery was £2. Their present profit was less than was made in pre-war days.

The chairman: Don't you consider it rather important to put the proper description on your invoice lest any question should arise afterwards under the Sale of Food or Drugs Act?

Witness: We do.

Then how was it that your *pro forma* invoice was put under the term "washing soda"?—A *pro forma* invoice is not an invoice. It is not a sale, but an invitation to send along money and we will supply. We give the goods the same name as a customer gives them. For instance, grocers speak of carbonate of soda when they mean bicarbonate of soda, and they refer to the latter when they desire washing soda.

In answer to further questions, the witness said that they liked to get deliveries of soda ash in 20-ton lots. They were, however, now manufacturing more or less from hand to mouth. They sent to Silvertown and obtained 2-ton lots. They had a contract running with Brunner, Mond & Co. for the supply of soda ash at £6 10s. a ton. The present market price of soda ash was £7 a ton.

Mr. May said that the respondents desired to repudiate any suggestion that they were profiteering. They were now selling soda at a profit of £3 a ton, whilst in pre-war days the profit was £5. Other chemical manufacturers were at the time offering a similar article at 16s. a cwt. If the complainants had agreed to purchase the substance they would have received a receipt which would have stated fully what it was, while the goods themselves would also have been adequately labelled.

Decision

The chairman, in giving the decision of the tribunal, said that owing to the shortage of supplies of soda the complainants sought to get the substance from a firm of manufacturing chemists. The article in question was one which was in common use, and was found in almost every household. It was occasionally known as soda crystals and at other times as common soda. The *pro forma* invoice rendered by the respondents referred to "3 cwt. of washing soda." The respondents contended that the *pro forma* invoice was not an offer to sell, but the tribunal disagreed, and the transaction came within the scope of the Profiteering Act. The evidence given by the representatives of Brunner, Mond & Co. and the United Alkali Co. showed that the market price of soda was £5 10s., and what the respondent had attempted to do amounted to profiteering. The defence put up by the respondents seemed to the Tribunal to be nothing more or less than an attempt to introduce some complicated technical evidence calculated to confuse the issue in the case, and likely to mislead a Tribunal, the members of which were not furnished with any particular technical knowledge on the subject. Fortunately that Tribunal comprised certain members who had commercial, technical and chemical experience in the handling of washing soda and soda crystals and also of carbonate of soda crystals purified in accordance with the standard laid down in the British Pharmacopœia. It was impossible that any non-technical member of the public asking for washing soda, or receiving an invoice of such a character could understand it to refer to carbonate of sodium prepared according to the formula and the quality laid down in the British Pharmacopœia. That standard was something even beyond what Brunner, Mond & Co. and the United Alkali Co. sold as commercial soda ash. The two firms mentioned sold soda ash at £7 per ton, and they also sold the soda in its recrystallised form at £5 10s. a ton. The respondents had been doing business regularly with Brunner, Mond & Co., and on February 24 of the present year purchased 22 cwt. of the pure alkali from them at £6 10s. a ton. Under these circumstances the Tribunal were unable to accept the suggestion made by the respondents that although they sent out the *pro forma* invoice inviting cash in advance with the description of washing soda, they would in fact, had the money been forthcoming and the offer been accepted, have sent pure carbonate of soda crystals of British Pharmacopœia standard. If there were any misunderstanding there was at any rate no misunderstanding regarding the document the respondents sent out in which they described the substance as washing soda. The Tribunal considered it a very bad case. They found the case proved, and would order the papers to be sent to the Director of Public Prosecutions with a view to further proceedings being taken as provided for in the Act.

"Washing Soda"

To the Editor of THE CHEMICAL AGE.

SIR,—In a newspaper report of proceedings before the Central Complaints Committee on Thursday last, in which we were concerned, no reference is made to our explanation that the article offered at 15s. per cwt., carriage included, was soda carb. cryst. B.P, which is the only quality of "washing soda" or soda crystals that we make or sell. The higher cost of manufacturing an article prepared with distilled water, with limits of lead 5 parts per million, arsenic 2 parts per million, and free from chlorides, sulphates, &c., was evidently not understood.—Yours, &c.,

Battersea, S.W. 11, June 5. MAY & BAKER, LIMITED. W. G. HYDE, Director.

The Case of Tinlings, Ltd.

In the second case the complaint was lodged by Mr. H. Cohen, wholesale and retail grocer, of 31, High-street, Kingsland, who alleged that he was offered soda crystals by Tinlings, Ltd., general produce merchants, of 31, Cowcross Street, E.C., at a price of £15 a ton, the market price being £5 10s. a ton.

The Respondents' Case

Mr. Tinling, the managing director of the respondent company, said that his concern had offered soda crystals to retail grocers and others in different parts of the country. On April 16 last the company issued the following circular:—

"Dear Sir,—Soda crystals. Being associated with a company whose registered offices are with us, and whose capacity of output is practically illimitable, we are in a position to offer soda crystals for delivery commencing not later than June 17 at the price of £15 a ton, delivered London, or on rail. As the demand for this commodity is so great and the present supply is so restricted we can only accept orders accompanied by a deposit of 50 per cent."

The witness agreed that when written to on the subject Tinlings, Ltd., replied that they could not produce invoices showing what price they paid for soda crystals, as they had not recently purchased any. The company would, however, be glad to purchase a large quantity of soda crystals at 15s. a cwt. When they issued the circular referred to they were hoping that they would be able to purchase at less than 15s. a cwt. in order to sell at that price.

Mr. Butler, of Brunner, Mond & Co., said that in April of the present year the price of soda crystals was £5 10s. a ton. That price had been in force since September of last year.

Mr. Tinling: Is it within the knowledge of your company that very much higher prices were obtained this year for soda crystals?

Witness: Yes, there is quite a traffic in them at very much higher figures. There are frequent references to this matter in the trade journals.

The chairman: Is that dealing by outsiders and not by persons in the trade?

Witness: That is so.

The witness then produced quotations showing that much higher prices than £5 10s. a ton were being quoted for soda crystals.

Mr. Arthur, of the United Alkali Co., also said that in April of the present year the market price of soda crystals was £5 10s. a ton.

Mr. Tinling, in giving evidence, said that last year his company purchased soda crystals through an agent of the United Alkali Co. at a price of £8 15s. The last lot purchased was for 20 tons.

The representative of the United Alkali Co. denied that sales at such a price with them had taken place.

Mr. Tinling further stated that his company applied to every firm in London and the country, and they understood that the market price of soda crystals was anything from £15 to £20 a ton. Under these circumstances the company could not be accused of attempted profiteering. When the company issued their circular they were hoping to obtain soda from the Larne Salt & Alkali Co., Ireland. The Larne Co. had its registered office in the same building as the respondent, and it was hoped that the former would produce brine and soda. It could not, however, be produced by the Larne Company at anything like £15 a ton. It would now cost very much more than £15 a ton to produce. Tinling's, Ltd., was a private limited company with a capital of £100,000.

Questions About a Circular

The chairman said that when Tinling's Ltd., issued their circular on April 16 the company, which had an "illimitable output" was the Larne Salt & Alkali Co.

The witness said that was so, and the chairman then suggested that on April 16 the Larne Co. was derelict.

Witness: My friends had just put up £74,000 for that company. He went on to say that Kearley & Tonge had told him that they had thousands of orders for soda.

The chairman: Why did you want people giving orders to send you a deposit of 50 per cent.?

Witness: We did not particularly want the money, but we wanted to restrict the number of orders and be sure that we were getting firm orders.

Have you received any deposits of 50 per cent.? I think we have in one or two instances.

Have you supplied the goods? Not yet.

Have the Larne Co. ever manufactured an ounce of soda crystals?—No, they have never manufactured any, but capital was found for the company, and we were told it would be in working order in three months.

In answer to further questions, Mr. Tinling said that the Larne Co. actually started working a fortnight ago. They had not supplied any soda to buyers and had not contracted to deliver any for some weeks.

Mr. Butler was recalled, and said he had never heard that there were such deposits of brine at Larne as would justify the establishment of expensive works, there.

The chairman: Do Brunner, Mond & Co. require people who give them orders for soda crystals to deposit 50 per cent. of the purchase price in order to obtain delivery in two months?

Mr. Butler: No. He added that it was untrue to suggest that Brunner, Mond & Co. fixed the market price at £5 10s. a ton because they were under contract to sell at that price. They did not sell soda crystals by contract.

Mr. Arthur was also recalled and denied that the United Alkali Co. fixed the price of soda crystals at £5 10s. a ton, because they were bound by contracts.

Mr. Tinling said that before financing the Larne Co. expert advice was taken and they were informed that it would not be a paying prospect unless £15 a ton were obtained for soda crystals. If they could only get £5 10s. a ton for soda crystals, the Larne Co. could not work at a profit.

Decision

The chairman said the tribunal were of the opinion that the circular issued by the respondents was very remarkable. The market price of the soda was £5 10s. a ton, and the Tribunal rejected the suggestion that the market price of an article was any expanded speculative price that persons who obtained supplies and held them up chose to advertise at. The Larne Co. apparently up to a very recent date was a derelict company.. When the circular was sent out in April that company was not in a position to supply soda crystals, and was not likely to be in such a position for some time. The Tribunal took a very serious and severe view of the case. They not only found that there was a calculated attempt at speculative profiteering, but they also regarded it as a very serious matter that Mr. Tinling was trying about the time in question to get soda at £5 10s. a ton from Brunner, Mond & Co., and the United Alkali Co., or either of them, and offering it at £15 a ton. In addition, the respondents were trying to get 50 per cent. of the purchase price where they could. They were keeping that 50 per cent. in hand, with the result in law that had the market fallen the respondents would have been in a position to hold the unfortunate depositors of the 50 per cent. to their bargain. "It is," proceeded the chairman, "a wholly reprehensible proceeding, and one that we should be very sorry to suppose exists to any wide extent in British commercial circles. There is another point in this case to which I must draw attention. The result of this speculative profiteering is to place the ultimate burden on the shoulders of the unfortunate consumer who, in the vast majority of cases, belongs to the poorer classes, because it is in the homes of the poor that washing and things of that sort are done, and washing soda and soda crystals are most commonly known. Looking at the figures in this case, it is quite evident that instead of being in a position to sell this article at a price varying from ¾d. to 1d. a lb., the retail grocer, forced to purchase at this greatly enhanced price, would have to charge his customer from 2½d. to 3d. a lb. in order to make any profit at all. We regard this as as bad a case as any that has come even before this Tribunal, and we shall give directions for the papers to be placed before the Director of Public Prosecutions in order that further proceedings may be taken."

The Case of J. Manger & Sons, Ltd.

The complainant in this case was Mr. A. Coward, of 22, Tyrrell Road, East Dulwich, who was charged 11s. for 1 cwt. of soda by J. Manger & Sons, Ltd., soda manufacturers, &c., of Kingsland, E. The complainant alleged that he had previously been charged 7s. 3d. per cwt. by the respondents, whilst the market price was 5s. 6d., and gave evidence in support of his allegations.

Mr. Manger, who appeared for the respondents, said, in reply to the chairman, that they would not refuse to execute orders received in future from Mr. Coward. His firm had been selling soda for a very long time, and during the past 25 years they had been manufacturers. Up to the end of last year they were able to obtain supplies of raw materials. Unfortunately since that date they had not been able to obtain the raw material, owing to a big demand from abroad. That meant the closing down of the factory. They had hundreds of customers on their books, and in order that they should have some soda the respondents purchased from firms outside London, sometimes at high prices. The respondents had never charged their customers more than 11s. a cwt., although in some instances they had themselves paid a higher price in order to obtain it. He produced invoices showing purchases which the respondents had made from A. G. Collins & Brother, Cardiff. The purchase price of the soda was from £8 10s. to £11 per ton. It had since risen and they had been offered soda at as much as £16 a ton.

Transactions with a Cardiff Firm

Mr. Louis Collins, manager of A. G. Collins & Brother, chemical and soda ash manufacturers, Cardiff, said he understood that the soda supplied to the respondents was for export, and he was at that time of the opinion that the Profiteering Act did not apply to goods which were intended for the export trade. He admitted having entered into contracts with the respondents to the extent of £337, on which a gross profit of £96 was made, or about 28½ per cent. His firm were under contract to deliver a further 5 tons of soda to the respondents, and they would lose on the transaction. Sellers of soda were frequently asking as much as £14 to £15 a ton, while in some instances the price was quoted as high as £18 per ton. £5 10s. a ton could hardly, he thought, be called the market price. There were three big firms in the soda trade, Brunner Mond & Co., the United Alkali Co. and Gossages. Their price for a long time past has been £5 10s. a ton, but they had not had the soda to deliver. It was not the market price, but merely the maker's price.

The chairman inspected a number of invoices produced by the witness, and pointed out that on March 13 his firm were actually buying from Brunner Mond & Co. at £5 10s.

The witness said that as a great concession Brunner Mond & Co. let them have 2 tons. He did not justify the high prices at all. He thought they chiefly arose out of the peculiar position.

The chairman said that A. G. Collins & Brother had purchased 2 tons of soda at £6 10s. 7d. a ton from Stranaghan, Stephens & Co., Cardiff, while on April 9 they purchased 3 tons at £9 a ton from Mr. Sidney Cohen, a retail grocer in Cardiff. He asked if Mr. Cohen purchased the soda at £5 10s. a ton, and was induced to part with it because A. G. Collins & Brother offered him £9 a ton for it.

The witness: I don't know what Mr. Cohen paid for it.

The chairman said that on some of the soda the witness's firm handled they made a gross profit of over 100 per cent. on the cost price, while on the selling price the gross profit was in one instance as high as 55 per cent. He asked what was the justification for such a high standard of profit in Cardiff.

The witness said that they had to take a risk in getting supplies.

Then with your eyes open you went into a gamble? Well, it was a bit of a gamble. We thought the stuff was wanted for export.

The chairman said that the documents produced in the case showed that the Cardiff firm had purchased soda crystals from Brunner, Mond & Co. at £5 10s. a ton, and re-sold it to the respondents at £11 10s. a ton. That was a gross profit on the purchase price of approximately 120 per cent. He also pointed out that the Cardiff firm had written to Brunner, Mond & Co.

saying that they wanted soda for a shipping order. They obtained 2 tons of soda crystals and proceeded to sell it for home consumption at a gross profit of 120 per cent. The witness had also produced documents which showed that they had received offers of soda from firms in Grimsby, Birmingham, London, Liverpool, Glasgow, Manchester, Warrington, Leeds and Bradford. Those firms offered soda crystals at prices ranging from £13 to £18 a ton. When Messrs. Collins failed to get further supplies from Brunner, Mond & Co. they got their friends, William Jackson & Co., to obtain a supply from the United Alkali Co., Messrs. Jackson then re-sold to Messrs. Collins at a profit of 10s. a ton.

In answer to further questions, the witness admitted that he had purchased 2 tons of soda from Stranaghan & Stephens, who had several retail shops in Cardiff.

The chairman: You purchased at an average price of £6 11s. 7½d. a ton and re-sold at once at more than £13 a ton.

Mr. Manger, of the respondent company, said that up to the end of last year his firm purchased soda ash, which they converted into washing soda. In January the Ammonia Co., from whom their supplies were obtained, went into liquidation. Brunner, Mond & Co. and the United Alkali Co. were rationing their own customers, and therefore he could not obtain supplies from them. Under the circumstances he tried to get supplies of washing soda for his customers in order to keep the trade together.

Decision

After deliberating in private, the chairman said that the respondents were a limited company who had salt works at Kingsland and soda works at Bow, and for 25 years had carried on the business of washing soda manufacturers. Last December, owing to their inability to obtain supplies of raw materials they had to stop manufacturing soda. That caused considerable trouble to a large number of their regular customers who could not keep going without supplies of washing soda. The respondents sold their own stocks of soda at normal prices. Then, to oblige customers and keep them going, they made purchases where they could and sold to their clients at very little profit, and in some cases at an actual loss. The tribunal were satisfied that the soda sold to the complainant on March 5 at 11s. per cwt. actually cost Messrs. Manger more than that amount. Under the circumstances they decided that the respondents' prices were not unreasonable in the circumstances, and accordingly the complaint against them would be dismissed. The conduct of the respondents throughout that enquiry had been open and candid and the tribunal were glad to be able to say that they appeared to be a perfectly honourable trading firm.

Chairman on "Widespread Gambling Conspiracy"

The case, however, could not end with the clearing of the reputation of the respondents. "We should," proceeded the chairman, "fail in our duty if we did not take note of the evidence disclosed during the hearing of the complaint. That evidence has shown the existence of a wide-spread gambling conspiracy—I can find no other appropriate term for it—on the part of merchants and others to take advantage of the shortage of supplies to force up to an outrageous height the price of all the household soda they could lay hands upon.

"We find that household or washing soda is made by dissolving soda ash in water and then allowing it to crystallize out. The crystals so obtained are about three times the weight of the original soda ash, owing to the water absorbed in the crystals, and in this strength the product is suitable for general household uses. We find that this soda ash is used in enormous quantities for many purposes and that its manufacture can only be carried on economically upon a very large scale. We find that there are two groups of firms, two rival combines, at present making the bulk of the soda ash used in this country. Those firms are Brunner, Mond & Co. and The United Alkali Co. These two great firms supply soda ash at £7 per ton to some scores of lesser firms who turn it into washing soda in the manner I have described. These lesser manufacturers have not the means or conveniences for making the soda ash themselves, so that soda ash becomes in reality their raw material, but it is not the raw material of the bigger firms who make it. These bigger firms through their representatives have given evidence before us, which we accept, to the effect that they have had difficulty in obtaining their raw material, and as a result they have been obliged to ration their customers, both the smaller makers who buy soda ash to convert into household soda, and the traders who buy household soda ready made. We find it to be the fact that Brunner, Mond & Co. and the United Alkali Co. have honourably declined to take advantage of their position and have maintained their normal price both for soda ash and for household soda, and we are satisfied that the people who are responsible for the enormous inflation of prices, of which we have heard, are the outside speculators and gamblers, and we have no doubt that they have inspired these inaccurate, misleading and mischievious newspaper allegations as to monopolies and profiteering simply to provide a cloak and an excuse for their own evil doings."

Severe Comments on Evidence

The chairman went on to refer to the evidence given by Mr. Collins, and declared that the result of the evidence was the disclosure of a state of affairs which was more extraordinary than anything that had hitherto been disclosed to the tribunal. Messrs. Collins, of Cardiff, had made numerous purchases themselves and had been offered a considerable number of consignments by about a dozen firms whose names were before the tribunal. With regard to Messrs. Collins' own transactions it appeared that between February 3 and May 3 they purchased household soda from various firms to the value of £337, and in respect of that they made a profit of no less than £96 6s. 3d. gross. Subsequently there was another transaction on which there was a loss, as it was bought on the market at a higher price, and the gross profit made was reduced to about £85. The tribunal were of the opinion that a profit of £85 on a deal of 37 tons of soda, of which only 13 tons was handled, was altogether outrageous. Mr. Collins was of the opinion that all business was a gamble. That might be his experience, but the tribunal would be sorry to think that was an accurate description of the tone and standard of British commerce. It was a curious fact that in February Messrs. Collins were content with a profit of 10s. a ton. Mr. Collins seemed to have caught what appeared to be the prevailing epidemic of profiteering. It was an epidemic which was widespread, covering something like a dozen big towns in England. If a person were unfortunate enough to contract a prevailing epidemic he must not be surprised if he had to abide by the unpleasant consequences of having caught it. The tribunal would be failing in their duty if they did not refer the evidence in regard to the transactions carried out by Messrs. Collins to the Complaints Committee of the Profiteering Act Department, who had power to refer the matter to the Board of Trade, who again had power, if they thought fit, to initiate any necessary prosecution. It was only fair to Messrs. Collins to say that their representative had shown a candour which was altogether unusual. Mr. Collins was a type of trader who had not grasped the fact that a Profiteering Act was on the Statute Book, or having grasped it, had come to the rather unwise conclusion that it could be ignored. The tribunal would also take a similar course in regard to the dozen merchants in different parts of the country who had been offering soda for sale at prices ranging from £13 to £18 a ton, in order that their cases might be thoroughly investigated.

Mr. Collins had admitted obtaining about 2½ tons of soda from Mr. S. Cohen, a grocer who traded as the John Bull Stores, in Cardiff. Mr. Cohen appeared to have been willing to supply to Messrs. Collins at a quick profit a portion of the material he had obtained presumably for his proper business as a grocer. He seemed to have sold some at £9 and some at £10 15s. a ton.

Stranaghan & Stephens Exonerated

Another firm which had been mentioned was Stranaghan & Stephens, of Cardiff, who sold 2 tons of washing soda to Messrs. Collins. The tribunal were of the opinion that there was nothing in the transaction so far as Stranaghan & Stephens were concerned, and nothing which reflected to their discredit. They could only regret that what Mr. Collins and his firm secured from Stranaghan & Stephens they sold at a wholly unjustifiable profit and therefore the soda was not available for the householders of Cardiff, who must have been in urgent need of it for their ordinary domestic purposes.

In concluding, the chairman said the tribunal hoped that the result of that enquiry might be to put an end once and for all to any further gambling and profiteering in a very essential and widely demanded household commodity, and also that what he had stated might have the effect of setting public opinion on the subject of monopolies at rest, at any rate so far as soda was concerned.

The World Problem of Nitrogen

Lecture by Professor F. G. Donnan

In connection with the series of lectures on recent developments in science, arranged by the London County Council, a lecture on "The World-Problem of Nitrogen" was delivered by Professor F. G. Donnan at University College on Monday, June 7, the chair being taken by Lord Moulton, late Director-General of Explosives Supply.

Fixation of Nitrogen in Nature

Dealing with the natural phenomena which contributed to the fixation of nitrogen, Dr. Donnan mentioned the electrical discharges in the atmosphere, particularly in the Andes, where electrical thunderstorms were very common; then the fact, definitely established but not yet fully worked out, that the combination of oxygen and nitrogen might be brought about by ultra-violet light, and, finally, the work of innumerable bacteria, which in a way not yet determined, were able to fix atmospheric nitrogen and combine it in a form in which it could be used by plants. The latter was the means by which the nitrogenous material of virgin soil was produced. The nitrogen in coal and peat provided another form of fixed nitrogen, whilst in earlier times the supply of saltpetre from India and the East had been one of great importance from the point of view of the manufacture of gunpowder.

An interesting chapter in the history of chemistry concerned itself with this latter question, and with the enormous influence of Great Britain in stirring other nations into scientific activity, notably with respect to the artificial saltpetre beds established in France during the wars of the early 19th century by means of which animal excreta in the presence of alkali was hydrolysed by bacterial action to ammonium compounds and by further bacterial action oxidised to nitrites and nitrates. Chile saltpetre, occurring in the northern deserts of Chile had formed with sulphate of ammonia the great source of nitrogen naturally, the production in 1913 exceeding 2,556,973 metric tons, of which Germany had secured 833,000 metric tons. The production of ammonium sulphate as a by-product in the manufacture of town gas and producer gas, by the removal of the traces of ammonia by washing with sulphuric acid, had provided an important source of nitrogen, but, whereas the British imports had shown a rapid rise before 1913, British production had remained at a constant level.

Industrial Fixation

The first method of artificially fixing nitrogen to be discovered was the electric arc process, the earliest observation of which was due to Cavendish. The practical importance of this observation was first realised by Sir William Crookes who, in 1892, demonstrated the phenomenon experimentally at a meeting of the Royal Society and showed that the arc produced by a high potential discharge through the air could be made to generate an aureole of burning nitrogen. (At this stage a repetition of the experiment in question was made. At a comparatively low potential an electric spark of the normal character was obtained, but on increasing the intensity of the discharge the appearance of the spark changed, the violet colour being marked by the enveloping yellow flame of burning nitrogen. By striking such an arc between two terminals in a large globe filled with air, the formation of brown fumes of nitrogen peroxide by the oxidation of nitric oxide produced in this manner was demonstrated).

This method, Dr. Donnan explained, was capable of commercial application only where energy could be obtained cheaply, as only 2 to 3 per cent. of the energy supplied was converted into chemical energy. Hence it was only in Scandinavia and by the Niagara Falls, where there was an abundance of water power to be tapped, that this process was employed technically. Lantern slides were then exhibited, giving general views of the works in question, diagrams of the Birkeland-Eyde disc-arc in which a discharge across water-cooled electrodes was drawn out by a powerful magnetic field into the form of a disc of flame in a furnace through which a rapid current of air was drawn, and finally of a somewhat similar type of furnace at one time adopted by the Badische Analin Fabrik, but now no longer employed.

The next process was the cyanamide process, which, though cheaper in power, demanded large amounts of calcium carbide, the supply of which was often a matter of difficulty. It was prepared by heating lime and coke in an electric furnace, was then ground and heated in a current of nitrogen. The calcium carbide was decomposed, with liberation of carbon, giving a sub-carbide which combined with nitrogen to form calcium cyanamide—NC.NCa. Prior to the war this process had developed into a great industry in America, and during the war it was still further developed there and in France and, to an enormous degree, in Germany. Cyanamide alone was a good nitrogenous fertiliser, but the purpose for which it was produced was the manufacture of ammonia by heating with steam and the subsequent utilisation of this ammonia for the manufacture of TNT, cordite, propellant and explosive ammonium nitrate.

The Haber Process

The third process was worked out in a quiet laboratory by Professor Haber before the war; and there was no doubt that the date of the war was finally fixed partly by the opening of the widened Kiel Canal, and partly by the perfection of the Haber process, which made possible the manufacture of ammonia in vast amount. Previously the Germans had put an enormous amount of capital into the Norwegian industry, but finding that they were in a position to conduct the industry in their own country equally well and much more cheaply, they withdrew these investments before the war. A great deal of investigation on this process had been carried out during the war in the laboratories of University College by the research group of the Munitions Inventions Department, and, had the war lasted another year, a large British factory would then have been at work on the production of ammonia by this means. The method depended on the combination of nitrogen and hydrogen in the presence of a catalyst at 500 to 600°C., and at about 200 atmospheres pressure. The best definition of a catalyst was that given by Lord Moulton—"the lovers' trysting place"—the place where lovers are able to meet. Of the large number of catalysts employed in this reaction by the Badische Company a combination of iron and molybdenum was perhaps the best. In the course of the researches in the laboratories of the college 70 to 80 catalysts were investigated, and an apparatus was erected in 1918 which produced synthetic ammonia at the rate of 10 lb. an hour. As the reaction involved was exothermic, it was possible to maintain the reaction continuously without application of heat by starting it initially at a sufficiently high temperature and abstracting the heat from the outflowing gases in order to heat the incoming; hence the only application of work which was necessary to maintain the action was required for pumping the liquids and compressing the gases.

Table showing relationship between per cent. yield of ammonia and the conditions of temperature and pressure.

Pressure.	Temperature.			
(Atmospheres)	550°	650°	750°	850°
1	·0769	·0321	·0159	·0089
100	6·7	3·02	1·54	·874
200	11·9	5·71	2·99	1·68

The more rapidly the gases were passed, the less time the catalyst was allowed to act, hence the smaller was the proportional yield of ammonia; but, on the other hand, the amount of gas which had been passed through was greater and the actual yield might, therefore, be higher. These two factors determine the optimum rate of flow for any given conditions.

Table showing energy consumption of the processes (in kilowatt-years per ton of nitrogen fixed).

Arc process	8·4 ...	Ratio 21
Cyanamide process	2·0 ...	5
Haber process	0·4 ...	1

A further process was that involving the formation of cyanide. Alkali carbonate mixed with finely divided iron and carbon and heated in a current of nitrogen gave a considerable yield of alkali cyanide. Though the pioneer work in this process was carried out by two Englishmen, the technical expansion of the method was not realised until the war period, when a number of American patents were taken out. Sodium cyanide was itself important in the gold industry, and furthermore, when heated in steam, it liberated ammonia, leaving sodium formate, which, to complete the cycle of reactions, might readily be reconverted into sodium carbonate.

Conversion of Ammonia into Nitric Acid

Ammonia tended to combine with oxygen, but the rate of combination was normally slow; but the reaction was further complicated by the fact that the final product of oxidation

was nitrogen and water. Hence, when the reaction had been catalytically accelerated, it was only by intercepting the intermediate stages that the required product could be obtained. When a mixture of ammonia and air was passed over a hot catalyst there might result a 95 per cent. conversion of ammonia into nitric oxide. This was then cooled, combined with a sufficiency of air and then made to pass with excess of air up a series of towers down which water was trickling. By the resulting solution of oxides of nitrogen a 50 to 60 per cent. solution of nitric acid might easily be prepared.

A method of direct conversion into ammonium nitrate was worked out in the college laboratories, and the first specimens of synthetic ammonia and ammonium nitrate made in the British Empire were produced there. The method of oxidation employed was an excellent example of the phenomenon of rhythmic catalysis. A strong solution of ammonia was contained in a globe into which oxygen might be fed and which contained a spiral of platinum inserted in a glowing condition into the globe. The wire continued to glow by reason of the combustion of ammonia occurring on its surface. With the introduction of oxygen the glow steadily increased, until the critical rate of combination being attained, the ammonia and oxygen exploded. The glow was then nearly extinguished, but again steadily increased until a new explosion occurred. (A practical demonstration of the phenomenon was made at this stage). A modified form of this method was also demonstrated, a current of air and ammonia being in this case passed over heated platinised porcelain. White fumes of ammonium nitrite and nitrate were produced.

Two other processes were also available. One involved the oxidation of ammonia by certain base metals, and the other employed the agency of bacteria. The latter process was worked out in Sweden during the war, and the British Government was at one time considering the utilisation of the method. The British high explosive consisting to the extent of 80 per cent. of ammonium nitrate, the direct production of this material was a matter of critical urgency; and it was due to the efforts and wizardry of the chairman, Lord Moulton, that our colossal demands were met.

In conclusion, Dr. Donnan displayed a series of lantern slides of statistics concerning the production and consumption of the various forms of fixed nitrogen by various countries in different years, and a sheet of coloured diagrams which brought out very clearly the part which the synthetic processes had played in creating the supplies of explosives required by Germany for military purposes. There was also included a nitrogen balance-sheet of the United Kingdom for the period 1911-1913, and an estimate, drawn up by Dr. Russell, of the Rothamsted Experimental Station, of the post-war consumption of artificial nitrogenous fertilisers.

Unrealised Possibilities of Nitrogen

Lord Moulton, in proposing a vote of thanks to the lecturer, which was heartily passed, described the subject of the lecture as the gravest question touching chemistry and human life. Without artificial fixation of nitrogen, the war would have been an absolute impossibility; for the German schemes depended on two points, the possession of unlimited explosives and a gigantic population, neither of which was capable of realisation without boundless supplies of fixed nitrogen. The Germans had shown us in a way that we should never forget that it was the duty of a nation to look ahead, to think of its future and to neglect nothing that would secure its safety and prosperity in the times to come. The real live part of the earth, the chairman went on to say, was in the gases which surrounded it, the oxygen which was the source of all our energy, and the nitrogen which, but for the infinitesimal portion consumed in the little nibbling of plants and bacteria, had seemed entirely useless. Now that we had realised this fact, if we could only utilise it, we could change the future. Nitrogen itself was one of the strangest of elements—it appeared to be a domestic element. As long as it was married to one of its kind, forming a nitrogen molecule, the couple were as happy as could be and entirely useless. The only way in which one could make nitrogen show its capabilities was to coax it from its domestic circle and make one atom marry one of a different kind. Then one could lead nitrogen through the whole gamut of changes, from the fiercest acid to a powerful alkali, and it was perfectly willing. This great system of divorce had been the subject of the lecture, and it was on our being able to spread dissention enough among the nitrogen molecules to get a large proportion of them married elsewhere that the future of the world depended.

Studies in Photographic Sensitisers

Sir W. J. Pope's Paper on the Carbocyanines

At a meeting of the Royal Photographic Society in London on Tuesday last, Sir W. J. Pope gave the second of his lectures on "Studies on Photographic Sensitisers," dealing with the Carbocyanines.

In a previous paper an account was given of an investigation of the relation between the chemical constitution and the photosensitising power of a series of substituted isocyanines. The most useful of these sensitisers was known by the trade names of Pinaverdol and Sensitol Green. In the present Paper he dealt with another type of photosensitising dyes closely related to but entirely distinct from the isocyanines. The sensitiser of this type in most general use bore the trade names of Pinacyanol and Sensitol Red.

The isocyanines previously dealt with resulted from the condensing action of an alkali hydroxide on a mixture of a quinoline alkiodide with a quinaldine alkiodide. Thus, Sensitol Green was produced by the condensation of quinoline methiodide with p-toluquinaldine methiodide. Since a large nucleus of each of the two molecules undergoing condensation persisted in the resulting isocyanine molecule it was possible to prepare isocyanines in which the substituting groups present in the two nuclei differed both in position and in composition. A specific unsymmetrical character might thus exist between the two large parts of the isocyanine molecule. Compounds possessing this particular kind of unsymmetrical constitution were not so readily accessible in the series of sensitising dyestuffs now under consideration.

The dyestuffs of the Sensitol Red class were produced by the condensation of two molecules of a quinaldine alkiodide with one of formaldehyde under the influence of alkalis. The only members of the class which could be conveniently prepared at present were necessarily those which were similarly substituted in the two quinaldine nuclei present in the molecule of the resulting dyestuff. The variations in constitution practicable were thus much more limited in number than in the case of the isocyanines.

Two constitutional formulæ had been proposed for Sensitol Red—one by O. Fischer and the other by Wise, Adam, Stewart and Lund—but neither of these was free from objection. The experimental evidence which had been accumulated in his laboratory and which would be published later, supported a constitutional formula which represented the dyestuff as produced from two molecules of quinaldine ethiodide with elimination of one molecule of hydrogen iodide and two atoms of hydrogen.

After describing in detail the carbocyanine derivatives which had been prepared and their sensitising action on gelatino-bromide plates, Sir William Pope said that in addition to the conclusions which had been drawn in the body of the paper several other points called for accentuation. First, it appeared clear that the type distinction between the isocyanines and the carbocyanines lay in the coupling of two quinoline residues by the link, : CH—, in the former case, and by the conjugate chain : CH.CH : CH, in the latter. The multiplication of the number of units of the constitution, : CH, which occurred in the carbocyanine was accompanied by an extension of the extra-sensitisation far into the red region of the spectrum. It might be suggested that if methods were available for still further lengthening the characteristic conjugated chain present in the carbocyanines, namely, : CH . CH : CH., it would be possible to sensitise still further into the infra-red.

Again, in many classes of synthetic dyestuffs the compounds of greatest practical utility were found among the more complex members of the series; the consideration of the so-called azo-dyes exemplified the truth of this statement. Among the carbocyanines, of which the photosensitising action had been described, the dyestuffs of simpler constitution had proved more powerful sensitisers than those of more complex constitutions. The series of paratoluquinaldine derivatives, in which the complexity of the alkyl-group attached to the nitrogen atoms was increased from methyl through ethyl and *n*-propyl to *n*-butyl, was an excellent example of this, with the striking inconsistency, however, that the methyl compound was the weakest sensitiser in the group. This might perhaps be partially accounted for by assuming that the dyestuff acted as a colour screen, and prevented much of the incident light from reaching the sensitive material.

Oil Resources of the Empire

Lecture by Sir John Cadman

BEFORE the Indian and Colonial Sections of the Royal Society of Arts on Friday, June 4, Sir John Cadman explained the position of the British Empire with regard to the oil resources of the world.

So much publicity, the lecturer said, was being given to the subject of petroleum at the present moment, that it was difficult to explain what it all meant. On the one hand, an effort was made to show that one group of capitalists was more worthy and better fitted than another to develop the petroleum which probably underlay certain parts of the hinterland of Mesopotamia: and on the other hand, the present world's shortage of petrol introduced famine prices, which, it was suggested by some, should be corrected by price-limiting machinery—which would result in focussing this shortage more acutely on those who adopted such machinery.

As regards oil in Mesopotamia, it had been known for many years that Mesopotamia offered possibilities for the prospector, and it had been open to all comers to try to extract it. The country had not hitherto enjoyed a stable Government, and it was only now when it was suggested that it should come under the mandate of Great Britain, and the responsibility of keeping law and order was relegated to the charge of a responsible Government, that the prospect of acquiring concessions in Mesopotamia had suddenly become so attractive. It was for this reason that concession hunters had utilised the press in the wish to sway public opinion into their line of thought—in the hope that the die might cast in their favour.

On the other hand, the enormous growth in the use of petroleum products, stimulated in no small degree by the war, had led to a demand which at the moment threatened seriously to outstep the supply. Production paralysed during the war, by lack of material for field development, had not kept pace with the requirements, and in consequence there was a world shortage, with the natural result of famine prices and an abnormal eagerness to explore new and untried fields.

U.S. Percentage of the World's Supply

The continent of North America, the lecturer stated, produced to-day over 85 per cent. of the world's output of crude oil. Of this the United States at present produced in her own territory nearly 70 per cent. of the world's oil output, while if the quantity produced by the United States in Mexico were added, the total United States control in North America was at least 80 per cent. of the world's oil supply. It would be seen, further, that the British Empire produced only about 2½ per cent. of the world's supply, or, if Persia might be said to be under British influence, about 4½ of the whole.

It was only too true that the United States was herself consuming ever-increasing quantities of oil, and that her available exportable surplus of oil was dwindling. It had been said that the United States reserves of oil were becoming rapidly exhausted, but it was difficult to accept the very pessimistic reports which had lately been made public. Oil was not a commodity that could be easily measured, and no estimates, however conservative, could be strictly relied upon. Nevertheless, it was true that the greatest producer of oil to-day was absorbing more and more of her own supply, and it was necessary for us to look round to see, in the most friendly way, from where were we going to be served when the United States found it difficult to supply us.

It is most unfortunate that the press of this country and the press of the United States, should at this juncture be hurling wild statements about, many of which were most misleading and inaccurate. The following comments might be offered:—

(1) Certain requirements as to British directorates and domicile were imposed on petroleum producing companies in some parts of the British Empire, but there was no general ban on foreigners of the nature alleged. Even where such restrictions were in force American interests were to be found at work—*e.g.*, in Canada the Imperial Oil Co., a direct and very powerful subsidiary of the Standard Oil Co., occupied a commanding position, and in Trinidad an American company, the General Asphalt Co. of Philadelphia, controlled one of the principal operating companies. While foreigners were excluded from India, there were no restrictive measures in Australia, New Zealand, South Africa or Egypt.

(2) It had been suggested that it was our settled policy to prohibit the sale of British oil companies to foreign interests and even the transfer of shares in British oil companies to aliens. Any regulations of this kind were war measures of a perfectly natural and legitimate kind, and it was quite inaccurate and misleading to refer to them as part of the permanent policy of the Government, and as indicating a determination to exclude foreigners from participation in British oil enterprises.

Again, in regard to Persia, the suggestion that Americans were under any special disability in that country was absolutely incorrect. As the Anglo-Persian Oil Co. held the concession other British and foreign interests were naturally excluded, but there was no truth in the statement that the Anglo-Persian Oil Co.'s rights had been in any way strengthened by the Anglo-Persian Agreement of 1918. The concession was acquired in 1901 through the individual enterprise of Mr. W. K. D'Arcy, and it was equally open to Americans or any other nationals to secure it. As regards occupied areas, it had, as stated, been the policy of the Government to prevent prospecting for minerals by British or foreign companies until the future administration of these territories was settled. The Oil and Coal Leasing Act lately passed in the United States contained a reciprocity clause providing that, if any country placed restrictions on United States citizens in regard to the working of coal or oil, the nationals of that country should be excluded from any participation in the working of lands covered by the Act.

Mr. A. C. Bedford, of the Standard Oil Co., said that what was needed was an aggressive foreign policy on the part of the United States Government, while Senator Phelan proposed the formation of a United States Oil Corporation to stimulate the development of foreign oilfields by Americans. As to this, it need only be said that in the past Americans had prospected or found oil in Roumania, Palestine, China, the Dutch Indies, Canada, Mexico, Costa Rica, Colombia, Peru, Cuba, Trinidad and elsewhere. Any oil concessions which British subjects held abroad had been acquired purely by individual enterprise, and they enjoyed no special advantage in the way of Government backing, nor did they wait to secure Government encouragement and support. On this difficult question Great Britain was too sensible of what she owed to those who had kept her so well supplied in the past, to adopt any attitude other than that of strict impartiality and fairness.

Conditions Favourable to Petroleum Deposits

Having made these preliminary remarks upon certain aspects of the oil situation, the lecturer dealt with the conditions under which petroleum existed and in what quantity it might be expected to occur within those conditions.

Liquid oils might be divided into two groups:—

1. Those which occurred in nature as crude liquids.
2. Those which could be obtained by distillation from shales and coals.

It was an interesting geological fact that the conditions which favoured the deposition of natural petroleum seemed to be associated with two definite geological horizons—viz., the tertiary and the carboniferous—and it was during this period that vegetation thrived on this planet, as the following table showed:—

The Geological Distribution of Oil in the Chief Oilfields are as follows:

Geological formation.	Percentage production.	Locality.
Tertiary.....	49·4	California, Gulf Coast, Mexico and most of the British Colonies.
Upper Cretaceous.	1·0	Texas, Wyoming, Colorado.
Lower ,,	...	.....
Jurassic	...	.....
Triassic	...	.....
Permian.....	...	.....
Carboniferous, Upper Devonian	41·1	England, Texas, Oklahoma, Kansas, Pennsylvania, Illinois, and the Appalachian field.
Devonian.....	·4	Canada.
Silurian	...	.....
Ordovician	8·1	Lima-Indiana.
Cambrian.....	...	.....

Sir John then showed very approximately how far these rocks were disseminated over the surface of the planet, and how

relatively little had yet been done in prospecting for petroleum within this vast tract of land.

The figures for production for 1918 were as under :—

	Production, 1918 (tons).
United Kingdom	250,000
Canada	40,000
Trinidad	300,000
India	1,150,000
Egypt	250,000
Australia, New Zealand, Sarawak	10,000
	80,000
Total British Empire	2,080,000
Persia	1,500,000
World's production	70,000,000

United Kingdom Consumption and Sources of Supply

The following figures approximately show the present consumption and source of supply for the United Kingdom, although in 1918 the consumption was on the basis of 5½ million tons per annum :—

Imports of all petroleum products to the United Kingdom.		Consumption in the United Kingdom.	
Origin.	Quantity (tons).	Products.	Quantity (tons).
United States of America	1,800,000	Crude oil	30,000
Mexico	500,000	Kerosene	620,000
Dutch East Indies	120,000	M.T. Spirit	650,000
British India	60,000	Lubricating oil	260,000
British West India Islands	130,000	Gas oil	120,000
Persia	90,000	Fuel oil	1,020,000
Total	2,700,000	Total	2,700,000

The consumption and production of petroleum products in the British Empire had been approximately :—

	Consumption.	Production.
1912	4,212,000	1,421,000
1913	4,713,000	1,519,000
1914	5,467,000	1,563,000
1915	5,184,000	1,629,000
1916	6,128,000	1,655,000
1917	7,485,000	1,774,000
1918	9,038,000	2,078,000

1918.

	Consumption.	Production.
Great Britain	242,500	5,395,000
India	1,146,000	1,292,000
Canada	43,500	1,717,000
Australia	10,300	110,000
New Zealand	600	67,000
South Africa	—	54,000
Egypt	263,000	424,000
Trinidad	291,000	112,000

The lecturer then reviewed briefly the present position of the oil supplies of each zone within the Empire which was at present attracting attention, explained how oil was discovered, and gave a short history of the industry.

Mining and Mechanical Engineers

Members and associate members of the North of England Mining and Mechanical Engineers are entitled to nominate, in writing, 24 councillors out of the members or associate members of the Institute to act as its representatives on the Council of the Institution of Mining Engineers. These nominations are to be sent to the assistant secretary on or before June 22, for incorporation in the balloting list. The names of the existing representatives are : Messrs. R. S. Anderson, Sidney Bates, W. C. Blackett, R. O. Brown, W. Cochran Carr, Benjamin Dodd, John English, T. Y. Greener, Reginald Guthrie, Samuel Hare, A. M. Hedley, Philip Kirkup, C. C. Leach, Henry Louis, W. C. Mountain, H. M. Parrington, Walter Rowley, F. R. Simpson, John Simpson, R. S. Tate, J. R. R. Wilson, W. B. Wilson, and E. S. Wood.

Aluminium and Its Alloys

Cantor Lecture by Dr. W. Rosenhain

AT a meeting of the Royal Society of Arts on Monday, Dr. W. Rosenhain delivered the third of his series of Cantor Lectures on "Aluminium and its Alloys."

Dealing first with the physical properties of these alloys, the lecturer said that an alloy of aluminium to which 4 per cent. of copper had been added had in the form of chilled cast rod a strength of 9 tons per square inch, and its ductility was about 10 per cent. There had been a tendency in practice to use higher copper contents up to 12 per cent. This might be justified to a certain extent for castings to stand heat, but for ordinary castings it was a mistake, the 12 per cent. being heavier than the 4 per cent., and not as good mechanically. If in the 4 per cent. alloy manganese were used in the place of some of the copper, certain advantages were obtained. It had a better strength in the chilled cast condition; one could get up to 12 tons and an expansion of 13 per cent. That being so, why use 12 per cent. copper? With the old 15 alloy containing 15 per cent. zinc and no copper strengths of 11·1 and 11·7 tons per square inch with the sand and chilled cast respectively—nearly as good as the 3 copper and 1 manganese—and very reasonable expansion. If 3 per cent. of copper were used as well a definitely superior result was secured, over 14 tons with the sand cast and just under 14 with the chilled cast. If the zinc content were increased very much the strength of the alloy was increased and also the ratio of strength to weight, but castings could not be made less than a certain thickness for foundry reasons.

Effects of Prolonged Heating

The N.P.L. suggested figures for the L5 alloy, but when the works came to do it they failed to get those figures. The N.P.L. repeated their experiments, and also failed to get them, and the reason was found to be that those alloys improved by keeping. A table was shown giving the increase in strength of various alloys over periods varying from 9 days to 10 months. By tests of prolonged heating startling results were obtained in the case of the 4 per cent. copper alloy. That alloy had, as normally cast, a duplex micro structure, consisting of aluminium saturated with copper—a solid solution and crystals of aluminium compound. If these could be got into a state of equilibrium it would all be in solid solution. To get it into solid solution it took three days at a temperature between 450° and 520°. This caused the tensile strength of the 4 per cent. alloy to rise from about 9·5 tons to nearly 15 tons, and the elongation from 8 or 10 per cent. to 20 per cent.

The use of the aluminium piston in internal combustion engines was a great advantage, due to its thermal conductivity. The efficiency of the engine increased with the amount of compression that could be applied to the explosive mixture before it was ignited, and that depended upon the temperature in the piston end of the cylinder during compression. With the aluminium piston the power of an engine could be increased by about 20 per cent., accompanied by a considerable decrease in the petrol consumption, compared with the cast-iron piston, and a more uniform temperature was maintained owing to the equalising effect of the high conductivity of the piston.

Thermal Conductivity of Aluminium Compared With Iron

The thermal conductivity of aluminium alloys compared with iron was roughly 4½ times as great, and Dr. Rosenhain said that the 4 copper, 2 nickel, 1½ magnesium was the best of them all in that respect. A material like that, which melted at about 600°, it might be thought would not live in the roaring furnace of a powerful aeroplane engine, but that roaring furnace part was only round about the exhaust. The temperatures rarely exceeded 250° at the hottest point of the piston surface. With the cast-iron piston it was much hotter. A long series of tests was made of tensile strengths at various temperatures up to 400°C. Taking L5, which he believed to be the best for ordinary castings, starting with 13½ tons tensile strength, it went down rapidly to 2½ tons at 350°, and it was of no use at 250°. An alloy used for motor car pistons before the war, and which was strongly advocated for aeroplane pistons—the 12½ per cent. copper—started at 9½ tons, and dropped to about 4 tons at 350°. An alloy with 14 per cent. copper had the remarkable property that its strength did not at first decrease with rise in temperature, but increased. Starting at 9 tons, at 250°, it had risen to 10 tons, and at 350° was down to 7 tons.

Synthetic Ammonia & Nitrates, Ltd.

Brunner, Mond's Factory at Billingham

THIS company has been formed by Brunner, Mond & Co., Ltd., with a capital of £5,000,000, to take over from the Government the manufacture of nitrogen products from air, and to develop this manufacture on a commercial scale. The company is, by agreement with the Government, always to be British controlled, the directors are to be British-born, and the first directors are to be approved by the Government. It will be remembered that a certain amount of preparatory work for the erection of a factory at Billingham, Durham, for the manufacture of nitrogen by a modified Haber process was carried out in 1917 and 1918, but was suspended at the Armistice. After careful consideration of the question on a peace-time basis, the Government decided to hand over to private enterprise the continuation of this work, and requested Brunner, Mond & Co. to undertake it, this firm being chosen as being specially well organised for the successful development of a process of this type. Brunner, Mond & Co. have therefore formed Synthetic Ammonia and Nitrates, Ltd., to take over entirely this branch of their work.

The plant and work on the Billingham site was valued for the Government and for Synthetic Ammonia and Nitrates, Ltd., and a price agreed upon by which the whole property and development came into the hands of Synthetic Ammonia and Nitrates, Ltd., the Government agreeing to give the new company to be formed every possible assistance for the purpose of developing the process. The new company has taken over also from the Government the leading engineers and chemists who had been employed by the Government in the research work on the subject, and with these gentlemen as a nucleus has organised a staff of highly qualified scientists and technologists to carry out the work. Arrangements were made by which members of this staff were able to visit and thoroughly inspect the plant at Oppau, in Germany, where the Haber process has been worked out, and which had an output of some 250 tons of 100 per cent. ammonia per day. Visits of the company's experts have also been made to the United States of America, where the Government plant at Sheffield, Alabama, and the General Company's plant at Laurel Hill, New York, were exhaustively studied. The experimental plant of M. Georges Claude at La Grande Paroisse has also been visited and inspected in operation. The experimental plant of Dr. Maxted, of Gas Developments, Ltd., together with their information and patents has been purchased for the company.

In addition to this study of the present position of other synthetic processes, the company's staff has carried out a very thorough programme of research and design, and is now in a position to erect plant in the full confidence that the process chosen will prove to be superior to any now in existence. The process is essentially a modification of the Haber process, and was worked out entirely without German assistance. The company will, however, be protected by the Government against any interference by the Germans in the development of the process in England, and to this end have placed at the disposal of the company all enemy patents bearing on the process of a royalty basis. The payments under this arrangement are to go to the Custodian of Enemy Property for account under the Reparation Clauses of the Peace Treaty.

The company intends to erect immediately at Billingham a plant for the manufacture of 100 tons of 100 per cent. ammonia per day, with provision for a rapid extension to 300 tons per day, equal to 150,000, rising to 450,000 tons of sulphate per annum. Modern agricultural research has, however, proved that chloride of ammonia is equal, if not superior, to sulphate, and since by converting the ammonia into this form instead of into sulphate, carbonate of soda—soda ash—can be produced (a manufacture in which Brunner, Mond & Co. are pre-eminent), it is hoped that the agricultural community will eventually adopt this form. which can only have the effect of reducing the price to them of nitrogen fertilisers. Arrangements have been made with Explosives Trades, Ltd., by which they undertake to take their requirements of ammonia from the company and to erect plant to the extent desired by the Government for the oxidation of this ammonia to form nitric acid and the explosives derived therefrom. Thus, while the country's supplies of explosives for war purposes will be assured, the success of the company will undoubtedly greatly increase our capacity to produce our food supplies.

Nitrate of Soda Position

IN their monthly report on nitrate of soda, Henry Bath & Son, Ltd., state that the past month has been a very quiet one for the nitrate trade, both as regards the requirements of the present season and preparations for next. Consumption during May was disappointing, deliveries in Europe being less than one-third of those for May, 1914, and although some improvement in the demand may be looked for this month, the total of the season's consumption will not come up to expectations. Defective transport, shortage of labour, and strikes in France are partly responsible for this, but the principal reason is that the price has been too high. During the major portion of the consuming season the c.i.f. cost has been round about 25s. to 26s. per cwt., and these prices, coupled with the demoralising fluctuations of exchange which prevailed at the time, proved detrimental to demand. It is an undoubted fact that many consumers who wanted nitrate went without it rather than face the prices that ruled during April and the first half of May, and the consequence is that stocks of greater volume than anticipated in various ports will have to be carried over until next year. The attempts which were made last month to induce the German producers to join the association had no result. The German producers are in the happy position of enjoying the benefits resulting from the association without having to submit to the disadvantages thereof, and they will naturally maintain this position so long as they are permitted to do so. The production of synthetic nitrogen in various forms in Germany is said to be making some progress in spite of the scarcity of coal, and it is understood that Germany has this season produced internally 70 per cent. to 80 per cent. of its pre-war consumption of nitrogen. The sale price of the synthetic nitrogen has this season been less than half that at which nitrate of soda could have been imported into Germany, owing to the low value of the mark, but any material improvement in the latter should bring the two articles into more active competition. A decided preference would be shown for Chilean nitrate of soda at even prices, and it is known that the best acreage in Germany this year has suffered for the want of it.

Nitrate Association Prolonged: New Scale of Prices

FOLLOWING the news received on Saturday, June 5, of the extension of the existence of the Nitrate Producers' Association from January 10 to June 30, 1921, Thomson, Ackman, Junior, announce that the Association have decided to sell up to 1,100,000 tons on the following basis :—

100,000 tons	June	15s. 6d.	per qtl.
100,000 ,,	July	15s. 6d.	,,
100,000 ,,	August	15s. 11d.	,,
100,000 ,,	September	16s. 3d.	,,
100,000 ,,	October	16s. 7d.	,,
100,000 ,,	November	16s. 10d.	,,
100,000 ,,	monthy Dec.-April	17s. 0d.	,,

The directorate in order to create confidence among buyers to purchase for future delivery, announce their intention to include a "fall" clause for the present on all future sales. This clause will protect the buyers on all nitrate not paid for up to the date of any eventual reduction in price by the association becoming effective. In addition they agree that the protection on all nitrate sold for delivery up to August 31 shall be effective to that date, irrespective of whether it has been shipped and paid for. The "fall" clause will be allowed to apply to sales already made for delivery after June 1, 1920.

North of England Institute of Mining

The NORTH OF ENGLAND INSTITUTE OF MINING and Mechanical Engineers has received an invitation from the British Section of the Société des Ingénieurs Civils de France to take part in a short visit to Paris and to the mines and factories situated in the devastated regions of the North of France. The official time-table covers the period from Tuesday evening, June 22, to Friday night, June 25, whilst the cost to members of the official part of the tour would be approximately 600 francs (about £12) per head for first-class return railway fare from London to Paris and expenses in Paris. The presence of ladies will be specially welcomed. If any members desire to take part in the visit they should apply at once to the Honorary Secretary of the British Section of the Société des Ingénieurs Civils de France, 45, Great Marlborough Street, London, W.1.

Whinstone in the Bo'ness Coalfield

A Paper by Mr. H. M. Cadell

A GENERAL meeting of the Mining Institute of Scotland was held in the Heriot Watt College, Edinburgh, on Saturday, June 5, Dr. H. BRIGGS, vice-president, occupying the chair in the unavoidable absence of Mr. R. McLaren, M.P., president.

After a discussion on the paper read at the last meeting by Professor J. W. Gregory on "The Red Rocks of a Deep Bore at the North End of the Isle of Man," Mr. H. M. Cadell, of Grange, communicated a paper on "A Whinstone Laccolite in the Bo'ness Coalfield," in which he dealt with the knowledge which had been obtained of the sections during the last 20 years by the deep diamond boring operations.

The existence of a distinctive bed of green whinstone between the main and the underlying "Smithy" coal seam in the district had long been known to mining men. Unlike many other whinstone intrusions this one consisted entirely of decomposed and comparatively soft green olivine basalt, very easily bored by a chisel. This sill had never reached the surface in this area, and it was inferred that it was probably injected before a very great weight of sediment had been deposited above it, and therefore it belonged to the carboniferous limestone period. In a diamond boring made in 1915 on the reclaimed foreshore the usual section was drilled down to the main coal, and after passing through that seam it was expected that the whin sill above the smithy coal would be formed with the latter seam in its usual place some feet deeper, but this was not the case. It was found immediately under the coal in a position it had never been seen before, and no less than 106 ft. in thickness. A remarkable circumstance was that at this particular spot the eruptive rock had plunged downwards so that its upper surface was further below the main coal seam than at any other place known. It was here a geologically inverted laccolite bulging downwards instead of upwards as normal laccolites were supposed to do.

Chemical and Physical Analyses

Mr. Cadell gave the results of an analysis, chemical and physical, which he had obtained in order to ascertain the nature of the alteration in the coal-seam due to intrusion and also in the basalt itself. Two sets of figures gave the normal composition of the smithy coal seam (A) and of the burnt coal (B) items :—

	A. Per cent.		B. Per cent.
Fixed Carbon	62·37	...	26·02
Volatile hydrocarbons	30·53	...	4·51
Sulphur	1·20	...	Nil
Ash	3·10	...	67·05
Moisture	2·80	...	2·42
Totals	100·00	...	100·00
Specific gravity	1·274	...	1·93

The result of the metamorphism showed the elimination of nearly all the hydrocarbons and a great increase in the percentage of ash, while the specific gravity became greater.

The analysis of the laccolite yielded the following results :—

	Per cent.		Per cent.
Silica	47·75	Soda	0·89
Alumina	25·44	Phosphoric anhydride	0·08
Lime	4·11	Sulphuric	0·39
Magnesia	1·89	Carbonic	4·32
Oxides of iron	11·23	Titanic oxide	2·26
Potash	0·96	Loss and undetermined	0·68
			100·00

These figures showed that in comparison with a normal basalt or diabase the whin had much more alumina and less lime and iron than the fresh rock contained. The laccolite was thus poor in the minerals that had been injected into the coal, and a transference had apparently been gradually effected by means of heated water leaching out the lime and iron and re-depositing them in the coal after the hydrocarbons had been driven out. The inference might be drawn that the distillation was a high temperature one resulting in producing only coke and non-condensible gas. The coke remained and the gas percolated upwards through the overlying sediments before they were thoroughly consolidated, and became absorbed or bubbled out into the air without leaving a trace of oil.

Some questions were put and answered, but the discussion of the paper was adjourned till next meeting.

Oil and Colour Chemists

Proposed Affiliation with Society of Chemical Industry

THE Council's report for the year 1919-20, which was presented at the annual meeting and dinner recently, shows a continued increase in the membership, a noteworthy feature being that a number of American chemists engaged in the oil and colour industries are applying for membership. The present number of members is 151, a net gain on the previous year of 20. Of these 64 are London members, 77 provincial members, and 10 honorary members. The financial position is also satisfactory, and the income from the sale of the Journal is gratifying, the demand being mainly from America.

The Council has been represented at a number of meetings of the Federation of Technical Workers, the object of which was to arrange for representation on a Whitley Council for the industry. The outcome of these meetings was a decision to form the Federation of Technical Workers into a trade union, in order that it may take part in the work of the Whitley Council. As the Association of Oil and Colour Chemists, however, was formed solely to stimulate the scientific development of the industry it was not felt that it could fall in with this arrangement, and so far as the Association is concerned, no further steps are being taken in the matter. Another matter which the Council has taken up concerns a scheme for organised research, and although for the time being nothing definite is to be looked for there are hopes that a general scheme will be taken up in the near future.

The War Office Specification Committee of the Association has been at work upon some thirty-six specifications, and has sent in modifications of those relating to the following :—Linseed oil, boiled oil, turpentine, turpentine substitutes, liquid driers, white lead, lithapone, zinc oxide, yellow ochre, ered oxide, magnetic oxide, sienna, umber, bright lead, formalin, lead chromes, Brunswick green, Prussian blue, red lead, ultramarine, lamp black, and vegetable black. This work of revision has been much appreciated by the Directorate of Chemical Inspection, which has communicated with the Council to that effect. There are still several specifications which have to be dealt with in a similar manner.

The Council has also co-operated with the Engineering Standards' Association with regard to varnish and stoving enamels, anti-sulphuric paints, and oil varnish for boat fabric, &c. Much interest was taken by the Association in the quantitative method of determining water absorption of paints and varnishes devised by Dr. R. S. Morrell, and this test, in a modified form, is to be adopted.

On May 14, some members visited the works of J. B. Holliday & Co., whilst another party visited the works of Broadbent & Co., engineers. In the afternoon the whole party, consisting of 47 members, inspected the works of the British Dyestuffs Corporation, Ltd., and were entertained to dinner in the evening by the board of directors.

Election of Officers

The election of officers for the coming year resulted in Dr. R. S. Morrell being chosen as president in succession to Dr. F. M. Perkin. The new president, in the course of a short speech, said although he was non-resident in London, it so happened that fortunately during the next year he would be in London frequently, and he believed he would be able to do his duty on the Council. He was strongly in support of the policy hitherto adopted by the Council, and would endeavour to further that policy as far as possible. He felt that the Association ought to make itself a power among oil and colour chemists. It ought to have representation upon the Conjoint Board of Scientific Societies, of which there were 57 members, and he hoped that by the next annual meeting they would be able to report that the Association was represented on that body. The Association ought to have a strong backing, and this it could get if it affiliated with other societies, for instance, with the Society of Chemical Industry. In such an affiliation, however, they must always remember that they would lose their identity, and he was very jealous of preserving the identity of the Oil and Colour Chemists' Association. They should keep in as close touch as possible with the manufacturers through the Federation of Oil, Colour and Varnish Manufacturers, which ought to look to the Association for guidance in the practical and scientific work of the industry.

Mr. H. A. Carwood was re-appointed hon. secretary and treasurer, and in recognition of his work in the past a small cheque was handed him. Mr. Carwood suitably replied. Messrs. Tyson and Wood retired from the council and were replaced by Messrs. Haines and Molteni.

The dinner followed the conclusion of the business of the meeting.

Export of Copra

The Australian Commonwealth Government has decided to permit the EXPORTATION OF COPRA from Australia to any destination. The embargo on the exportation of copra from the late German New Guinea, except to Australia, in British vessels, will continue in force for the present.

Biochemistry of the Sterols

Third Lecture by Mr. Gardner

ON Tuesday, June 1, Mr. Gardner delivered the third lecture of the course on "The Biochemistry of Sterols," which he is delivering at the Physiological Laboratory, London University, South Kensington.

The lecturer continued his account of the action of oxidising agents on cholesterol, and described a triol, $C_{27}H_{45}(OH)_3$MP23, obtained by Windaus by shaking cholesterol in benzene solution with 4 per cent. alkaline permanganate. This triol yielded a well defined diacetate and dipropionate. The third oxygen was *alcoholic* in character, and the substance on oxidation yielded a diketo alcohol, $C_{27}H_{44}O_3$, MP 253, isomeric with oxycholestandiol, already described. It was readily converted into oxycholestenone ethyl ether, MP 166-167, which on hydrolysis gave the ordinary oxycholestenone. If cholesterol contains the following *complex* in two rings: $-CH_2-CH(OH)-CH-CH=CH-CH_2$, the relationship was as follows: Triol $-CH_2CH(OH)CH-CHOH-CHOHCH_2$, diketo alcohol $-CH_2CO-CH-CHOH-CO-CH_2$, oxycholestenone $-CH_2CO-C=CH-CO-CH_2-$.

Action of Reducing Agents

It was pointed out that the action of reducing agents was almost as varied and complex as the action of oxidising agents, but it was only since the development of modern catalytic methods that progress had been possible. Diels and Abderhalden in 1906 investigated the action of nascent hydrogen from sodium and boiling amylalcohol on cholestenone and cholesterol. From the ketone they obtained a saturated secondary alcohol $C_{27}H_{46}O$, β cholestanol, MP142-143, which yielded on oxidation a ketone $C_{27}H_{46}O$, MP128-129 β cholestanone. Cholesterol on similar treatment gave another saturated alcohol, which they named α cholestanol. This melted at 126-127, and yielded a well defined series of esters. It gave on oxidation a ketone α cholestanone, which melted 118-119, and which they regarded as isomeric with β cholestanone.

Soon afterwards, however, Windaus discovered that α cholestanol could be obtained by boiling cholesterol in amylalcohol solution with ready formed sodium amylate. He therefore regarded the α cholestanol as an isomer of cholesterol and not a reduction product. This fact, together with the production of a keto monocarboxylic acid, to which he assigned the formula $C_{26}H_{42}O_3$, by the oxidation of cholestenone by permanganate, led Windaus to the somewhat strained view that the double link in cholestenone must be in an open chain, while the keto group of cholestanonol, which arose out of the double link, was cyclically bound, so that in the formation of cholestanonol from cholesterin an intramolecular change took place.

He regarded cholesterol as containing an unsaturated side chain, $-CH_2CH_2CH=CH_2$, which condensed to a ring in the formation of cholestanonol. This view was provisionally accepted for many years, but was discarded after the comparatively recent discovery by Windaus and Uibig that α cholestanol really had the formula $C_{27}H_{56}O$, and was formed by the addition of an amyl group to the cholesterol molecule. It was also found that the keto monocarboxylic acid really had the formula $C_{26}H_{44}O_3$.

The simple relationship of cholesterol to β cholestanol was shown by Willstätter and Meyer in 1908, who obtained the latter by the reduction of cholesterol in ether solution at the ordinary temperature by means of hydrogen in the presence of activated platinum black. The lecturer described a form of apparatus by which this reaction could be readily and conveniently carried out. The completion of the reduction could be ascertained by determination of the rotation. The specific rotary power of cholesterol was negative, whereas that of β cholestanol was positive—$[\alpha]_0 = +28{\cdot}8°$. β cholestanol crystallised from dilute alcohol in six-sided leaves containing 1 molecule of water of crystallisation. It melts at 141·5-142°, and is considerably less soluble in cold alcohol than cholesterol.

Esters

A number of esters were described, of which the following may be mentioned. The acetate crystallised in glancing prisms MP 110-111°. The chloroacetate was characteristic, and formed glancing plates MP 178-179. The benzoate may be readily obtained in pyridine solution by the action of benzoylchloride. It was readily crystallisable, and the phenomena on melting were very characteristic. On gently heating in a melting point tube it assumed at 138-139 a reddish tinge, and at 140° began to soften and run together to an opaque opalescent mass of a red tinge with splashes of green. At 145 it was still opaque and the play of colours became more intense, red and emerald green predominating according to the point of view. The fluorescence became brighter as the temperature rose, until at 155 the colour suddenly vanished, and a clear liquid remained. On cooling the colour display again appeared in reverse order. Owing to the colour display the exact melting point could not be observed. On oxidation with chromic acid β cholestanol gave a ketone β cholestanon in over 90 per cent. yield. This melted at 128-129. An important property of β cholestanol was that it formed an insoluble compound with digitonin, and, like cholesterol could be estimated by means of this glucoside. It differed, however, in *not* giving the Liebermann reaction; thus, if treated in chloroform solution with anticanhydride (excess) and two drops of sulphuric acid it remained quite *colourless*. With a larger amount of sulphuric, however, a *pale* green colour developed. β cholestanol was found in in human fæces. The mode of formation showed that it was formed from cholesterol by the saturation of the double link with hydrogen, and that no inter-molecular change could have taken place.

Coprosterol

Coprosterol was another bihydrocholesterol, isomeric with β cholestanol. It was the form in which cholesterol was always excreted in human adults. It was probably formed by bacterial reduction in the intestines, as it was shown by Müller that a prolonged milk diet had the effect of sweeping out these reducing substances from the gut, and that then cholesterol was excreted as such. Coprosterol was obtained from the insaponifiable matter of fæces by crystallisation from acetone or 80 per cent. alcohol. It might be conveniently purified by distillation in a vacuum of under 1 mm. when it came over 210-220°. After repeated recrystallisation it melted at 104-105°. It crystallised from alcohol in long flat needles. It was dextro rotary $[\alpha]_0 = +24°$. A series of esters were described. The proponate MP 92° was perhaps the most characteristic. The benzoate melted at 114-115 without any colour display. It gave the Liebermann reaction in a manner similar to cholesterol, and also formed an insoluble digitonide. Dorée and Gardner showed that it could be easily oxidised to coprostanone $C_{27}H_{46}O$, which crystallised in leaves and melt at 62-63°. This gave an amorphous semi-carbazone and an amorphous oxime. With phenylhydrazine it behaved abnormally and the hydrazine formed *loses* ammonia giving coprosteryl carbazol, a crystalline body MP 192°. In addition to the ketone it gave, probably by further oxidation, a crystalline dibasic acid, MP.247 $C_{27}H_{46}O_4$.

When coprosterol was boiled for many hours with sodium amylate in amyl alcohol solution, Dorée and Gardner found that isomeric change took place with the formation of an isomeric saturated alcohol, ψ coprosterol. This could be crystallised in needles, and formed a series of esters of lower melting point than the corresponding esters of coprosterol. Neither this alcohol nor its esters possess anything like the capacity for crystallisation possessed by the isomeric bihydrocholesterols described above. ψ coprosterol gave the Liebermann reaction, but the colours were much less intense than in the case of coprosterol, and more sulphuric was required to produce them.

An important difference was that ψ coprosterol did *not* form any insoluble compound with digitonin. The change of coprosterol into ψ coprosterol was a reversible action, with the equilibrium point near the ψ end.

ψ coprosterol melted at 119°, but by distillation in a high vacuum the melting point could be raised to 126°.

On oxidation ψ coprosterol gave the *same* ketone as coprosterol, so that the difference between the two alcohols was due to the asymmetric carbon atom to which the H and OH were attached. Windaus and his co-workers have also shown that β cholestanol is isomerised by boiling with sodium amylate in a similar manner with the formation of an isomer ε cholestanol, MP 184°, which differed from β cholestanol in not forming an insoluble digitonide.

The study of these reduction products will be continued in the next lecture.

Society of Public Analysts

AT the ordinary meeting on June 2 at the Chemical Society's rooms, Burlington House, Mr. Alfred Smetham (president) in the Chair, a certificate was read for the first time in favour of Mr. T. K. Ghose, B.A., and for the second time in favour of Mr. U. A. Coates.

The following were elected members of the Society:—Miss D. G. Hewer, B.Sc. (London), Miss R. C. H. Johnson, Messrs. H. Hall, F.I.C., G. T. Bray, A.I.C., F. W. G. King, and J. H. Stubbs, M.Sc. (Victoria), F.I.C.

In a paper on "The Estimation of Nitro-Glycerine" by Mr. H. Droop Richmond, the hydrolysis of nitro-glycerine was discussed, and two methods of estimation—gasimetric and alkalimetric—were explained by the author who claimed satisfactory results for them.

Mr. R. L. Morris, in a paper entitled "A Study of the Determination of Potassium as the Perchlorate," pointed out that when the process was properly carried out, the results were highly accurate, the average error not exceeding −0·1 per cent. on pure potassium salts, and there was an average error of +0·1 per cent. in the presence of much sodium. Attention was called to the fact that the wash fluid should not contain less than 97 per cent. of alcohol after adding 0·2 per cent. $HClO_4$. Exact details of the method of carrying out the process were given with rules as to temperatures. Quartz dishes were recommended, and the necessity for the removal of sulphates was emphasized. The author stated that when Mg, Ca, Fe or Ba were present they did not interfere, but when Ba was present barium sulphate would be found in traces during evaporation over a gas flame.

A Coal Tar Pitch Contract

MR. JUSTICE BAILHACHE, in the Commercial Court on Monday, heard an action brought by Messrs. Erlebach & Co., of London Street, S.E., against Messrs. Gatty, Gaunt & Co., of Victoria Street, for damages for alleged breach of contracts, dated March 4 and April 15, 1919, relating to the sale of coal tar pitch.

The plaintiffs contended that although the pitch was bought as coal tar pitch for briquette making, it was not coal tar pitch, and was not suitable for this purpose. They resold the pitch to French buyers who made complaints, and an arbitration went against the plaintiffs. The damages claimed were about £1,600. The defendants' case was that they did not know the plaintiffs were buying for briquette making, and did not warrant the pitch as suitable for this purpose. It was coal tar pitch, but the plaintiffs were informed that it was of inferior quality, and contained a large percentage of ash. The plaintiffs bought on certain terms and resold on different terms, and that got them into trouble.

In giving judgment, his Lordship found that on the contract there was not a good delivery. The plaintiffs, however, were told when they bought the pitch that it contained a high percentage of ash and was of inferior quality. It was clear that the only coal tar pitch which could have a high percentage of ash was that which came from blast furnaces. The plaintiffs did not know sufficiently about it to know that it was practically inevitable that with a high percentage of ash this must have been blast furnace coal tar pitch. Blast furnace coal tar pitch could not be commercially sold as coal tar pitch, and was not a good delivery under a contract which called for coal tar pitch. There would be judgment for plaintiffs for an amount to be assessed; if no agreement, the parties to apply to his Lordship.

The Anglo-Swiss Review

WE have received the first copy of the *Anglo-Swiss Review*, which is issued from Basle, with the purpose of promoting commercial intercourse between the two countries. At this time of the year one thinks affectionately of pleasant places in the Oberland or whatever other part of Europe's playground one is most partial to, but the object of the review is not to tempt us with the summer delights of holidays among the mountains, or on the lakes or with the pleasures of winter sports, but to make a little better known the commercial and industrial enterprises of the Swiss people. The review is certain to help in this direction, and one article of interest to our readers gives an account of what the Swiss dye industry has done for England since 1914.

May Trade Returns

THE trade returns for May have established a new record for the post-war period. With only two more working days than in April, exports have mounted by over £13,000,000 to a total of £119,319,422, no less than £12,000,00 of the expansion coming under the head of manufactured goods. The adverse balance of trade, which in March stood at £45,916,000 and in April at £40,495,000, has been reduced to £26,754,000. The value of imports was £166,333,816, a decrease of £820,000 on the April figures and an increase of £30,721,328 on 1919. The re-exports were valued at £20,260,078, an increase of £8,764,726 on 1919.

The value of the chemicals, drugs, dyes and colours imported last month was £2,500,778, an increase over May 1919 of £941,577; of oil seeds, nuts, oils, &c., £9,068,874, an increase of £5,141,786; hides and skins, undressed, £3,071,444, an increase of £163,862; oils, fats, and resins manufactured, £6,411,889, an increase of £2,106,670; leather and manufactures thereof, £2,444,531, a decrease of £317,222.

As regards exports, we exported chemicals, drugs, dyes and colours to the value of £3,463,014, an increase of £1,172,889; oil seeds, nuts, oils, &c., £1,188,613, a decrease of £55,498; hides and skins, undressed, £440,068, an increase of £306,981; oils, fats and resins, manufactured, £1,711,235, an increase of £722,297; leather and manufactures thereof, £1,200,644, an increase of £656,132.

Taking the quantities as distinct from values, we exported 1,102 tons of oils, fats, &c., as against 557 tons in May 1919; china clay 50,079 tons against 19,828 tons; coal tar, pitch, 77,037 tons against 100,821 tons; coke and fuel, 221,907 tons against 290,781; soda compounds, 798,445 cwt. against 572,803 cwt.; dyestuffs, 30,070 cwt. against 12,381 cwt.; painters' colours, 115,928 cwt. against 134,268 cwt.; soap, 254,204 cwt. against 197,907 cwt.; candles, 37,046 cwt. against 19,543 cwt.; linoleum, 3,212,106 sq. yds. against 1,874,900 sq. yds.; cement, 53,497 tons against 28,112 tons.

Chemical Trade Inquiries

LOCALITY OF FIRM OR AGENT.	MATERIALS.	REF. NO.
Canada	Glassware. Replies to the Canadian Government Trade Commissioner's Office, Portland House, 73, Basinghall Street, London, E.C. 2.	—
Belgium	Coal tar products	799
Greece (Patras) ...	Tinplates; zinc	808
Norway ... ... (Christiania)	Chemicals; oils, &c.	809
Mexico	Vegetable oils	816
Turin	Drugs; chemical products; aniline dyes; mineral oils; benzine	—
Brussels	Petroleum derivatives; palm oil; cod liver oil	—
Algeria	Sulphates of copper; ammonium; potassium	—
United Kingdom .	Micarta or substitutes; bakelite or substitutes	—
Brussels	Oil varnish	—

Birthday Honours

THE list of Birthday Honours published last week includes the following:—

BARONETS.

F. B. Sanderson, Controller of Trench Warfare, National Filling Factories and Stores during the War. For public services.

M. S. Sharp, chairman of Bradford Dyers' Association For public and local services.

J. H. Stewart, J.P., partner of Alexander Stewart & Son, of Dundee, deputy chairman of Sheffield Steel Products, Freeman of the City of London. For public services.

KNIGHT.

W. B. M. Bird, founder of the Salters' Institute of Industrial Chemistry for providing scholarships for graduates in chemical science to enable them to continue research work.

IMPERIAL SERVICE ORDER.

C. Proctor, F.I.C., Superintending Analyst, Department of the Government Chemist.

From Week to Week

A large body of SHALE OIL is reported to have been found in the East Kimberley goldfields in Western Australia.

CENTRIFUGAL SEPARATORS, LTD., inform us that their telephone number has now been altered to Victoria 7136 (2 lines).

Mr. G. W. BALFOUR, chairman of the Castner-Kellner Alkali Company, has been appointed to the board of Brunner, Mond & Co.

THE FERTILISERS (TEMPORARY CONTROL OF EXPORT) BILL was read for the first time in the House of Lords on Tuesday. The Bill is to be read for the second time on Monday, June 14, and to be printed.

A SURVEY OF THE GERMAN IRON AND STEEL INDUSTRY, by Mr. C. J. Kavanagh, British Commercial Commissioner at Cologne, is published as a supplement to the *Board of Trade Journal* of June 3.

Two German mining experts, recently returned from Spain, announce the DISCOVERY OF POTASH DEPOSITS for which a concession from the Spanish Government will probably be granted.

Professor W. H. PERKIN, D.Sc., F.R.S., Waynflete Professor of Chemistry, and Fellow of Magdalen College, Oxford, has been elected corresponding member of the Institute of France Academy of Sciences for the chemical section, and also a member of the Royal Society of Science of Upsala.

Oxford University propose to confer the honorary degree of Doctor of Science on Surgeon-General Sir ALFRED KEOGH, Rector of the Imperial College of Science and Technology, and Sir RICHARD GLAZEBROOK, F.R.S., Fellow of Trinity College, Cambridge.

At a meeting of the PHYSICAL SOCIETY OF LONDON on May 28, Sir W. H. Bragg, president, in the chair, an interesting discussion on "X-ray Spectra" was held. The discussion was opened by the President, and among those who took part were Sir Charles Darwin, Dr. E. A. Owen, Dr. E. H. Rayner, &c.

The death has occurred in his 90th year of Mr. J. M. ELLIOTT, of Cheadle Heath, one of the oldest Manchester justices. Mr. Elliott was at one time connected with the firm of Elliott & Crabtree, starch manufacturers, Miles Platting, and retired some 20 years ago.

DR. ADAMI, vice-chancellor of Liverpool University, states that the most pressing need of the University at the present time is the erection of new chemical laboratories, and estimates that the cost of buildings of the most economical type cannot be much under £350,000.

It is understood that the scheme which in 1913-14 was under consideration for HARNESSING WATER FROM THE ASSUAN DAM, for the purpose of producing nitrates for the intensive agriculture of Egypt, is about to be revived. About 70,000 tons of chemical manure are now annually required from abroad.

A message from Paris, dated June 3, states that the PRICE OF SEEDS AND VEGETABLE OILS at Marseilles during the last month have gone down about 40 per cent., and a 10 to 15 per cent. fall has been registered in lentils and peas. Arachid oil is now quoted 100f. less than a month ago, whereas copra and palm oils show a decrease of about 160f. per 100 kilos.

It is announced that the directors of the Union Assurance Company, acting as trustees of the estate of the late Mr. William Dunn, banker and merchant, and Liberal Member for Paisley, have offered the sum of £165,000 for the building of an Institute of BIO-CHEMISTRY AT CAMBRIDGE University, for the provision of an adequate income for the Professor and staff, and for the endowment of research.

Representatives of the employers and workpeople engaged in the OIL CAKE INDUSTRY met in conference in London on Thursday, June 3, to consider an application put forward, through the National Federation of General Workers, for advances in wages of 3s. per shift for shift men, 15s. a week for day workers, and 7s. 6d. for juniors. An alternative offer was submitted on behalf of the employers, which will probably necessitate consideration by the unions concerned.

A general meeting of members of the ROYAL INSTITUTION was held on Monday, Sir J. Crichton-Browne, treasurer and vice-president, in the chair. The special thanks of the members were returned for a gift of £1,000 in the name of the late Dr. F. Du Cane Godman, F.R.S., per Dame Alice Godman. Dr. R. J. Reynolds was elected a member. The Maharaj Rana, K.C.S.I., Bahadur of Jhalawar, attended the meeting and signed the register of members.

TWO LECTURES, entitled "Emploi des metaux ammoniums en Chimie Organique" and "L'Œuvre Scientifique d'Henri Moissan," will be given at King's College, Strand, W.C., by Prof. P. Lebeau, professeur a l'Ecole Supérieure de Pharmacie, Université de Paris, at 5 p.m. on Monday, June 28, and Wednesday, June 30. The lectures, which will be delivered in French, are intended for advanced students of the University and to others interested in the subject. Admission is free, without ticket.

The Secretary of the Ministry of Labour states that the JOINT INDUSTRIAL COUNCIL FOR THE SOAP AND CANDLES INDUSTRIES, which was formed last year, and held its first meeting on July 9, 1919, has recently been recognised by the Ministry. The following officers for 1920-21 have been elected by the Council. Chairmen: Mr. John Gray, of Lever Brothers (retiring president of the Society of Chemical Industry), and Mr. W. A. Robinson, of the National Warehouse and General Workers' Union. Secretary: Mr. R. E. Huffam, of Crosfields, Warrington.

At a meeting held at the Central Hall, Westminster, on Friday, June 4, in support of the claim of the IMPERIAL COLLEGE OF SCIENCE AND TECHNOLOGY, South Kensington, for power to confer degrees and for University status, the chairman, Lord Morris, moved a resolution urging the Prime Minister, the Lord President of the Council, and the President of the Board of Education, to take the matter into serious consideration. The resolution declared that any further delay would cause a growing sense of injustice. Professor Watts seconded the resolution, which was supported by Sir E. Rutherford, Mr. J. A. Spender, Sir R. Redmayne, Sir A. Keogh, and carried with one dissentient.

M. François Maire, secretary-general of the Association of French Scientific Writers, has announced in the press his intention of forming a committee, including M. Deschanel, president of the Republic; Marshals Joffre, Foch, and Petain; MM. Raymond Poincaré, Millerand, the presidents of the Senate and Chamber and of the Municipal Council of Paris, to establi h a research institute with the view of APPLYING CHEMICAL DISCOVERIES TO INDUSTRY. The aim of the committee is to collect a sum of money to provide the material and means necessary for enabling chemists adequately to conduct their researches. The treasury of the institute is the Bank of France and a list of subscriptions is to be published as soon as the first million francs is collected.

A fire broke out (from an unknown cause) on Thursday, June 3, in a new distillation plant of the chemical works of HICKSON & PARTNERS, LTD., of Castleford, as a result of which the building, which is built of brick and concrete, was demolished within an hour. Shortly after the outbreak, the still burst with a loud report, and the concussion broke several windows in the neighbourhood. The firm's fire brigade fortunately prevented the spread of the flames to an adjoining boiler-house. The works were used for the manufacture of T.N.T. during the war. The new plant was part of the scheme for meeting present-day requirements, and was also used for the manufacture of intermediates and dyes. A considerable amount of damage was done, but it is hoped that some of the machinery may be saved. Fortunately nobody was injured. The premises are covered by insurance.

A paper on "OXYGEN IN GAS PRODUCTION," by Messrs. H. J. Hodsman and J. W. Cobb, was read before the Institution of Gas Engineers, who concluded their annual meeting at the Institute of Mechanical Engineers on Thursday of last week. The authors urged that oxygen should be used in the carbonisation of coal for gas production. The heat needed could be generated in the charge itself by the use of a regulated supply of oxygen. The complete gasification of coal might then be attained with the maximum of thermal efficiency. There were grounds for believing that in the future the price of oxygen would not be an obstacle to its use for gas making processes. If the oxygen method advocated were technically and commercially feasible, the large consumption by the gas industry would provide conditions conducive to cheap production of oxygen.

References to Current Literature

The journals referred to may be consulted at the Patent Office or Chemical Society's libraries. A list of journals and standard abbreviations used appeared in our issue of December 27 last.

British

COLLOIDS. Colloids and their use in medicine. R. C. Owen. *Pharm. J.*, May 22, 497-499.

GAS. Report of proceedings of 57th Annual Meeting of the Institution of Gas Engineers, June 1-3. *Gas World*, June 5, 471-522. A full account of the meeting, with the Presidential Address (by Sir Dugald Clerk), and the papers read and Committee reports presented (*see below*).

The casting of gas retorts. Report of Refractory Materials Research Committee, Inst. Gas Eng. *Gas World*, June 5, 478-481.

Internal corrosion of mains, services and meters. Report of Life of Gas Meters Joint Committee. *Gas World*, June 5, 481-485.

Efficiency in the use of different grades of gas. Report of Research Sub-Committee of Gas Investigation Committee. *Gas World*, June 5, 488-492.

Tests on carbonisation at Uddingston. Report of Research Sub-Committee. *Gas World*, June 5, 492-502. A record of many tests.

Oxygen in gas production. H. J. Hodsman and J. W. Cobb. *Gas World*, June 5, 510-517.

Contemplations on the Report of the Fuel Research Board. G. Warburton. *Gas World*, June 5, 517-519.

Town supply of gas from coke ovens. Progress in the United States. *Gas World* (*Coking Sec.*), June 5, 59.

HYDROCARBONS. Some high temperature reactions of benzene and toluene. S. F. Dufton and J. W. Cobb. *Gas World*, June 5, 485-488.

ORGANISATION. Psychological *versus* "scientific" management. C. S. Myers. *Engineering*, June 4, 773-774. Abstract of paper read before the Ceramic Society.

REFRACTORIES. Some comparative tests of machine-made and hand-made silica bricks. W. Emery and L. Bradshaw. *Gas World* (*Coking Sect.*) June 5, 61-62.

The specific heats of refractory materials at high temperatures. L. Bradshaw. *Gas World* (*Coking Sect.*), June 5, 62-64. Silica, fireclay and zirconia are dealt with.

WIRE. Steel wire and wire drawing. E. A. Atkins. *Engineering*, June 4, 749-752. Conclusion of paper previously noted (CHEMICAL AGE, 1920, 612).

French

ALSACE-LORRAINE. An excursion in Alsace and Lorraine. L. Barthélemy. *Mem. Soc. Ing. Civ. France*, October-December, 1919, 576-731. An account of a trip by members in Alsace-Lorraine, with interesting notes on, *inter alia*, the Pechelbronn petroleum fields and the Alsace potash deposits.

CHLOROBENZENES. Kinetic study of the chlorination of benzene. F. Bourion. *Comptes rend.*, May 31, 1319-1321. The influence of varying factors on the process has been studied.

United States

ANALYSIS. The determination of mercury. C. M. Bouton and L. H. Duschak. *U.S. Bureau Mines, Tech. Paper 227*, 40 pp. Various methods have been examined and a new process is described.

EXPLOSIVES. Theoretical maximum pressure developed in its own volume by thirteen military explosives. J. E. Crawshaw. *J. Franklin Inst.*, May, 607-625.

GLASS. The selection of glass for the manufacture of ampuls. G. E. Eivé. *J. Franklin Inst.*, May, 649-653.

METALS. Corrosive action of soils on iron and lead. L. A. Stenger. *Chem. & Met. Eng.*, May 26, 965-968. Tests on the electrolysis of metals in soils are described.

NITROGEN FIXATION. The Fixed Nitrogen Research Laboratory. A. B. Lamb. *Chem. & Met. Eng.*, May 26, 977-979. An account of Government investigations on the various processes for fixing nitrogen

PLANT. Reliability of materials and mechanism of fractures. C. de Freminville. *Chem. & Met. Eng.*, May 26, 983-987. Interesting notes on causes of fracture in metals, &c.

STEEL. A comparative test upon high-speed steels. A. J. Langhammer. *Chem. & Met. Eng.*, May 26, 969-975. Conclusion of paper previously noted (CHEMICAL AGE, 1920, 612).

WOOD. Phenomena of drying wood. H. D. Tiemann. *J. Franklin Inst.*, May, 645-648.

German

ALUMINIUM. Simple process for removing boiler scale from aluminium vessels. J. Grossfeld. *Chem.-Zeit.*, May 29, 402.

ANALYSIS. Exact methods for gas analysis. E. Ott. *J. Gasbeleucht.*, March 27, April 3, 17 and 24, 198-205, 213-220, 246-253, 267-271. A valuable paper.

Apparatus for the automatic analysis of combustion gases and recording the results. O. Braun. *J. Gasbeleucht.*, May 15 and 22, 310-315, 325-330. A description of the various types of apparatus.

Application of conductimetric titrations in neutralisation analysis. I. M. Kolthoff. I. Neutralisation of acids and bases. *Z. anorg. Chem.*, May 21, 1-27. II. Titration of acids and bases when present together. *Ibid.*, 28-51.

CARBON. The varieties of carbon produced by the reaction between calcium carbide and nitrogen. A. Remelé and B. Rassow. *Z. angew. Chem.*, June 1, 139-140.

ELECTROMETALLURGY. Electrometallurgy of the light metals during recent years. F. Peters. *Gluckauf*, June 5, 457-460. An interesting review of recent progress.

FURNACES. The management of shaft furnaces. W. Ostwald. *Feuerungstechnik*, June 1, 141-142.

GAS. Economics of gas-producer practice with recovery of tar and ammonium sulphate. *Stahl u. Eisen*, May 20, 685-680. Conclusion of article previously noted (CHEMICAL AGE, 1920, 411, 455, 534).

Double-gas and its application in gas works. H. Strache. *J. Gasbeleucht.*, April 10, 230-235.

METALS. The colours of tarnished metals. G. Tammann. *Z. anorg. Chem.*, May 21, 78-89. Experiments on the action of iodine vapour on metals are described.

NITRIC ACID. The production of concentrated nitric acid from nitrous gases. F. Foerster, T. Burchardt and E. Fricke. *Z. angew. Chem.*, May 11, 18 and 25, 113-117, 122-127, 129-132.

PHOSPHATES. The decomposition of primary potassium phosphate with increasing quantities of potassium bicarbonate. W. Windisch and W. Dietrich. *Wochenschr. Brau.*, May 22 and 29, 177-180, 187-189.

SALTCAKE. Manufacture of sodium sulphate without the use of sulphuric acid. G. Pollitz. *Chem.-Zeit.*, June 3, 413-414. Addendum to paper noted previously (CHEMICAL AGE, 1919, 420).

STEEL. Working conditions for producing chrome-nickel steel for aeroplanes. E. Kothny. *Stahl u. Eisen*, May 20, 677-684.

WATER. The iron and manganese content of water, and the removal of these elements. K. Hooijer. *J. Gasbeleucht.*, April 17, 253.

Montevideo Sulphuric Acid Factory

THE Government of Uruguay have increased to 130,000 pesos their vote towards a scheme for the establishment of a sulphuric acid factory at Montevideo. The loan as originally authorised was for 100,000 pesos, which has been spent on acquiring a site and building and adapting the latter and installing the necessary plant for the manufacture of sulphuric acid and its by-products. The additional 30,000 pesos now authorised is to cover the cost of apparatus ordered from Europe for the manufacture of hydrochloric and hydrocyanic acids, and for the purchase of raw materials, &c., required before the factory can begin operations.

Patent Literature

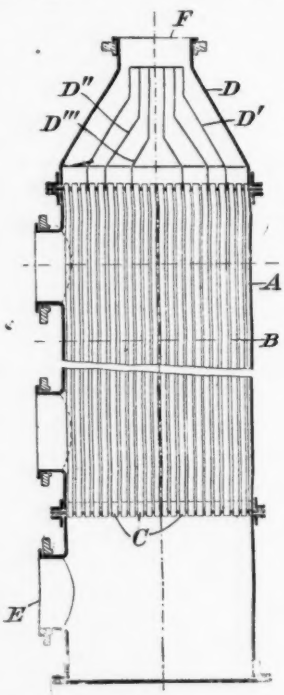
Abstracts of Complete Specifications

142,519. CONTINUOUS RECTIFICATION OF LIQUID AIR, APPARATUS FOR. E. Barbet et Fils et Cie., 5, Rue de l'Echelle, Paris. International Convention date (France), October 9, 1917. Addition to 131,321.

The principal patent No. 131,321 (*see* THE CHEMICAL AGE, Vol. I., page 421), describes an apparatus for the continuous rectification of liquid air, in which a fairly large number of recuperators or temperature exchangers are employed. This invention relates to the construction of the exchangers. The rate of transmission of heat from one gas to another is considerably increased if the gases are given a high velocity in contact with the metal walls of the tubes in the exchanger. The exchanger consists of bundles of tubes of great length and very small cross section, the middle portion of each bundle being enclosed in a shell which terminates at each end in a chamber of larger cross section. The ends of the tubes are spread out in these chambers and are fixed in tube plates. One of the gases is passed through the bundle of tubes and the other through the space between the tubes. In order to obtain a predetermined spacing between the tubes, each tube is provided at intervals with small rings of the necessary thickness.

142,522. CONTACT PROCESS FOR MAKING SULPHURIC ACID, HEAT INTERCHANGERS FOR GASES FOR USE IN. P. Audianne, 117, Boulevarde Haussmann, Paris. Application date, December 7, 1918.

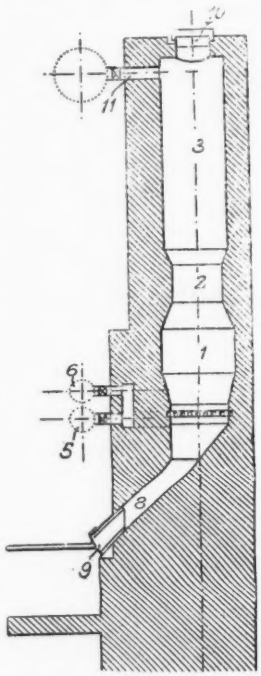
The object is to produce a heat interchanger which will enable sulphur dioxide to be oxidised into trioxide by the contact process without the use of any external heat after the process is once started. The hot gases leave the contact chamber at a temperature which does not exceed 425°C., and it is already possible to avoid the use of external heating in processes having a special type of contact chamber which does not require a gas inlet temperature higher than 220°C. In other processes, such as the Grillo-Schroeder, the gas inlet temperature must be about 300°C., and the object is to enable such processes to be carried out without external heating. A-vertical steel cylinder A contains a set of tubes B through which the cold sulphur dioxide passes from the inlet E to the outlet F and thence to the contact chamber. The hot gas from the contact chamber traverses the space between the tubes in the reverse direction, from the inlet G to the outlet H. The tubes are staggered relatively to one another and are spaced at such a distance that the cross section available for the passage of the gas is the same inside and around the tubes; the linear velocity of the gas should be above 3·5 metres per second. The number and length of the tubes and their diameter are arranged so that the total surface area available for the transfer of heat is 5 square metres per ton of sulphur trioxide passing through the apparatus in 24 hours, if the gases are to be heated to 220°C.; or 25 square metres per ton per 24 hours are required if the gases are to be heated to 325°C. To ensure an even distribution of the gas within the tubes, a throttling device C having helical channels is inserted at the inlet of each tube. For the same reason the outlet chamber D is provided with concentric conical partitions D′, D″, D‴.



142,522

142,541. FURNACES FOR THE DISTILLATION OF ASPHALT ROCK, BITUMINOUS SLATE AND THE LIKE. A. la, Porta 132, Via del Tritone, Rome, and R. de Bartolomeis, 7, Via Napo Torriani, Milan, Italy. Application date, February 3, 1919.

The furnace is for distilling asphalt rock or bituminous slate to obtain the combustible oil, by means of heat derived from the burning of part of the combustible matter in the rock. The material is fed from the hopper 10 into the distillation space 3 of the furnace, and the distillation gases are drawn off through the pipe 11. The material then passes downwards to the combustion zone 2 which is of smaller diameter, and then into the lowest zone 1, which is shorter but of larger diameter than the distillation space 3. Air for combustion and steam for washing purposes are blown in by fans through the pipes 5, 6, and tuyeres 4. The spent material is finally discharged through a shoot 8 provided with a shutter 9.



142,541

142,576. CATALYSTS, PRODUCTION OF. W. P. Schuck, 504, Wilcox Building, Portland, Ore, U.S.A. Application date, February 18, 1919.

The object is to produce a catalyst by the reduction of a metallic oxide, suitable for use in the hydrogenation of oils. The metallic oxide is obtained by the evaporation of a mixture of nickel nitrate solution and organic matter containing carbon, oxygen and hydrogen, such as cane sugar, glucose, dextrine, lactose and other sugars, tartaric, citric, oxalic and other acids. The solution is introduced into a muffle maintained at a temperature sufficient to secure a rapid evaporation of the solution, and containing an inert gas which may be obtained as the result of the chemical reaction or may be separately introduced. The proportions and strength of the solution must be such that when part of the water is evaporated a porous ball of material is produced. The heating is continued until a fine flaky powder remains, and this is withdrawn from the muffle by suction whilst still in suspension in the inert gas. This powder contains no free carbon and is not affected by exposure to air for several days; it may be used for hydrogenating oil at a temperature of 150°C. at atmospheric pressure. As an example, the solution used may contain 0·1716 gram of nickel nitrate and 0·25 gram of sugar per cubic centimetre, and the muffle may be maintained at 550° to 650°C.

142,703. OIL AND OTHER LIQUIDS, APPARATUS FOR THE PURIFICATION OF. King's Patent Agency, Ltd., London. (From B. Stone, 2153, Newport Place, N.W., Washington, D.C., U.S.A.). Application date, July 2, 1919.

The apparatus is for purifying oils and other liquids having a specific gravity lighter than water, or other liquids of higher specific gravity if some heavier medium is employed in place of water in the apparatus. A vertical cylindrical vessel is filled with water and carries a superposed receptacle which contains the oil to be purified. The lower vessel contains a number of superposed conical baffles of wire gauze which are alternately upright and inverted. The oil is forced downwards through a central vertical pipe and is injected into the water just below the lowest baffle which is inverted. The oil travels upwards and outwards over the surface of this baffle, and then passes under the surface of the baffle next above. The oil passes over the surface of this baffle to the centre, and so on

to the top. If the wire gauze is of such fine mesh that no oil passes through it when immersed in water, it is found that solid impurities are retained by the gauze. Impurities finally fall to the bottom of the purifying chamber and may be removed through a lock chamber without stopping the working of the apparatus.

142,710. FURNACES. T. Teisen, 52, Grove Avenue, Moseley, Birmingham. Application date, July 16, 1919.

The furnace is for the continuous heat treatment of materials at varying temperatures by passing them on an endless conveyor belt through a long horizontal chamber. Gas from a producer at one end of the chamber passes through ports in the chamber and mixes with sufficient air to complete its combustion, and the hot gas then passes through the remaining length of the chamber. Outlet passages are provided along the sides and bottom of the chamber and are regulated by dampers so that the hot gas may be withdrawn through them at any desired rate, and thus any desired temperature gradient may be produced along the length of the chamber. The outle passages communicate with a common flue in the floor of the chamber and the secondary air may be pre-heated by passing it through other passages close to this flue before mixing it with the combustible gas. Alternatively, the secondary air may be pre-heated by flues in the side walls of the producer.

142,715. HEATING OR COOLING FLUIDS, APPARATUS FOR. W. J. Mellersh-Jackson, London. From the Griscom-Russell Co., 90, West Street, New York. Application date, July 28, 1919.

The apparatus is of the type in which liquid to be heated or cooled passes through a chamber containing a number of parallel tubes through which the heating or cooling fluid is passed. A helical baffle is provided in the space surrounding the tubes, composed of a number of separate thin metal units each forming one convolution of the helix. The radial edges of each metal unit are bent over so that the adjacent units may be attached to one another and thus form a continuous helix, so that the liquid to be treated is compelled to traverse a helical passage. The longitudinal tubes pass through apertures in the helical baffle. The tubes may be connected in groups so that fluid passes through them in series. The casing may be constructed in two parts connected by an expansion joint to avoid strains and consequent leakage due to expansion. No packed joints are used between the passages containing the two liquids so that the apparatus may be used when it is particularly desirable that no leakage shall take place from one liquid into the other.

142,721. REFRACTORY MATERIAL. The British Thomson-Houston Co., Ltd., 83, Cannon Street, London, E.C. (From the General Electric Co., Schenectady, N.Y., U.S.A.). Application date, August 19, 1919.

The object is to produce a material which is particularly suitable as a lining for electric furnaces operated at very high temperatures, and which may be used indefinitely without cracking or other deterioration. Magnesium oxide which has been fused in an electric arc and crystallised, is granulated and mixed with about 5 per cent. by weight of a binder which will decompose at a high temperature and yield magnesium oxide; preferably magnesium sulphate or chloride is used. Alternatively a refractory cement having a lower sintering temperature than the lining material, or an iron compound, such as ferrous sulphate may be used. About 10 to 15 per cent. by weight of calcined magnesia which has only been heated to about 700°C. is then added and the mixture moulded with water as required. After drying for 36 hours the lining is heated slowly to the decomposition temperature of the binder and finally to 1,700° to 1,900°C. The calcined magnesia in the final product tends to contract when heated and thus counteracts the expansion of the fused magnesium oxide, so that the lining as a whole does not materially expand or contract at temperatures up to 1,800°C.

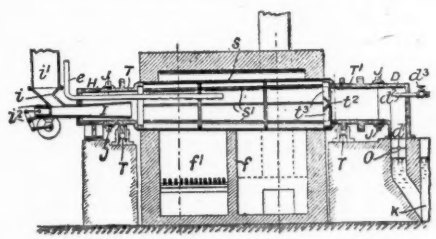
142,738. PARA-CYMENE, MANUFACTURE OF. British and Foreign Chemical Producers, Ltd., 10/12, Copthall Avenue, London, E.C.2. (From Rheinische Kampferfabrik G.m.b.H., Düsseldorf-Oberkassel, Germany). Application date, October 6, 1919.

The object is to obtain para-cymene from terpenes. The terpenes obtained as a residual product in the manufacture of artificial camphor by eliminating hydrochloric acid from hydrochloric acid addition compounds of pinene, and which have a boiling point of about 175°C., are treated with chlorine and the product is then distilled in steam. The oil which passes over is purified by treating it with oxidising agents, such as potassium permanganate, or polymerising agents, such as zinc chloride, and then distilling. Alternatively, fractions of the same boiling point from Swedish, Polish, and like turpentine oils may be treated in the same manner.

International Specifications Not yet Accepted

141,025. DISTILLATION OF OIL SHALES, COAL, &C. J. E. Kennedy, 120, Broadway, New York. International Convention date, March 31, 1919.

A rotating horizontal tapering retort *s* is provided with trunnions T, T′ at each end, supported on rollers, *r*, *r* and abutting with a gas-tight joint J against stationary conduits H and D. The material is fed from a hopper *i′* along an inlet



141,025

tube I by means of a reciprocating piston i^2, and is distributed over the hot walls of the retort as it rotates by longitudinal ribs *s′*. The gas evolved is withdrawn through the pipe *e*, and steam may be admitted through the pipe d^2. The solid residue is raised by the blades t^3 on the cone t^2 and discharged into the channel *d′* from which it passes through a water seal to the tank *k*. The retort is heated by a furnace *f′*.

141,028. PURIFYING OILS. K. Stiansen, Sandefjord, Norway. International Convention date, March 21, 1919.

A calcined natural phosphate, such as apitie, is added to the oil which is heated to 40° to 50°C., and the mixture separates into layers which may be tapped off. The phosphate may be used dry, or suspended in water, and instead of apatite, a calcined mixture of tricalcium phosphate with a metallic salt of a volatile acid may be used. The calcined phosphate may be treated with acids or alkalies. The precipitate obtained from the oil may be dried and used as a fertiliser.

141,044. LEAD AND SILVER CHLORIDES. Amalgamated Zinc (De Bavay's), Ltd., 360, Collins Street, Melbourne. International Convention date, March 29, 1919.

A chloridised ore containing lead and silver, obtained by heating with zinc chloride, is leached with hot brine containing ferric or cupric chloride for as short a time as possible. The conversion of the chlorides back into sulphides is thus avoided. If the ore contains ferric compounds, the ferric chloride may be produced by adding a little hydrochloric acid to the leaching solution. The ore is leached on a belt filter or on filter beds with the aid of suction, or a centrifugal machine may be used, the water being extracted first if desired, and the leaching solution then added.

141,056. GAS PRODUCERS. J. Lambot, 49, Rue Ernest-Charles Marcinelle, Charleroe, Belgium. International Convention date, April 3, 1919.

A rotary grate for a gas producer is mounted on a rotary ashpan which rests on rollers. The upper surface of the grate is provided with radial ribs for agitating the fuel and breaking up clinker, and air or steam may be supplied to the fuel through openings at the rear of the radial ribs.

141,057. ACROLEIN. C. Moureu and A. Lepape, College of France, Place Marcellin-Berthelot, Paris. International Convention date, March 31, 1919.

Glycerine is heated with potassium bisulphate with or without potassium sulphate, to produce acrolein. The distillate is fractionated, the acrolein is neutralised by an alkali or alkaline earth carbonate or bicarbonate, and then dried by means of calcium chloride or sodium sulphate.

141,058-9. SYNTHETIC RESINS. C. Moureu, College of France Place Marcellin-Berthelot, Paris, and C. Dufraiase, 189, Rue de Tolbiac, Paris. International Convention date, March 31, 1919.

141,058. Acrolein is polymerised by treating an aqueous solution with traces of a resinifying agent such as potash, soda, lime, ammonia, alkali carbonates, methyl- or ethyl-amine, aniline, lead hydroxide or acetate, or ferric chloride. A white powder is formed, which may be washed and dried; it is insoluble in water and hydrocarbons, but soluble in alcohols, ketones, or organic acids, and may be used for varnishes, insulating, &c.

141,059. Phenols are condensed with acrolein, or its polymerisation products obtained as above, in the presence of inorganic or organic bases, to produce hard insoluble resins which may be used as electrical insulators or for moulded articles.

LATEST NOTIFICATIONS.

143,848. Hydrogenation of oils, fatty bodies, &c., Catalytic processes for. Soc. Anon. l'Oxhydrique Française. May 28, 1919.

143,850. Ammonia and formic acid or formate of ammonium from barium cyanide, production of. Norsk Hydro-Elekt risk. Kvælstofaktieselskab. May 26, 1919.

143,854. Nitrogen and Hydrogen, Production of mixtures of Norsk Hydro-Elektrisk Kvælstofaktieselskab. May 23, 1919.

143,872-3. Calcium carbid, manufacture of. Union Carbide Co. January 20, 1915, August 15, 1917.

143,874. Waste Sulphate Liquors and Products therefrom, Method of Treating. Atomizer Products Corporation. November 16, 1918.

143,885. Authraquinoue, process for purification of. Kinglberger & Co. September 20, 1917.

143,891. Acetaldehyde from acetylene, manufacture of. Chemische Fabrik Grieshein-Elektron. August 10, 1916.

143,918. Gas Mixtures, Method and apparatus for analysing. Svenska Antiebolaget Mono. May 28, 1919.

143,920. Ores, flotation processes for concentrating. Elektro-Osmose Akt.-Ges. (Graf. Schwerin Ges.) July 29, 1918.

Specifications Accepted, with Date of Application

124,195. Acetic acid from paraldehyde as the primary material, Process of producing Soc. des Acieries et Forges de Firminy. March 13, 1918.

131,289. Sodium monochromate, Process for transforming into bichromate or chromic acid. Soc. Industrielle de Produits Chimiques. August 13, 1918.

135,217. Continuous coke ovens, Discharging apparatus for. Soc. Anon. D'Ougree Marihaye. September 28, 1916.

139,153. Oxyaldehydes and their ethers, Process for the manufacture of. A. Weiss. February 18, 1919.

143,291. Subjecting air gas or vapours to the action of liquid in the form of spray. C. H. Fowler. February 14, 1919.

143,321. Oils, fats and the like, Treatment of. G. Calvert. February 21, 1919.

143,341. Synthetic ammonia, Production of. E. K. Rideal and A. G. Tarrant. March 10, 1919.

143,353. Gas producers. D. J. Smith. April 5, 1919.

143,361. Gas from coal and/or the like, Means for generating. J. H. Corthesy and S. T. S. Castelli. April 12, 1919.

143,383. Centrifugal amalgamator and method of obtaining metal from ore. S. G. Musser. May 9, 1919.

143,392. Benzoic acid, Production of. W. P. Thompson. (*Etablissements Poulenc Freres, J. B. Senderens and J. Aboulenc*). May 27, 1919.

143,428. Distilling apparatus, Condenser for. J. H. Zaeckel. July 16, 1919.

Applications for Patents

American Smelting and Refining Co. Making Sulphur from sulphur dioxide. 15,121. June 3.

Barnes, F. G. Vaporising, expanding, and continuously using highly volatile spirits in power generators, &c. 14,915. June 1.

Berend, L, and Chemische Fabriken Dr. K. Albert. Preparing colloidal metals, metalloids, and compounds. 15,055. June 3.

British Dyestuff Corporation. Manufacture of chlorides and anhydrides of organic acids. 15,103. June 3.

Cahill, T. M., & Thompson, W. J. Vaporisers and atomisers for paraffin, &c. 15,234. June 5.

Carpmael, W. (Farbenfabriken vorm. F. Bayer & Co.). Manufacture of solutions of silicic acid and silicate cements, and silicate phosphate cements therefrom. 15,191. June 4.

Danckwardt, P. Process for producing anhydrous aluminium chloride. 14,944. June 2.

Dawson, W. A. Pulverising minerals, &c., and regrinding, grading, and treating resultant products. 14,818. June 1.

Dewrance, Sir J. Apparatus for forcing viscous fluids. 15,093. June;

Dutt, E. E. & P. C. Production of sulphur and calcium from gypsum. 14,827. June 1.

Farbenfabriken vorm. F. Bayer & Co. Manufacture of azo dyestuffs. 15,133, June 3. (Germany, July 16, 1918.)

Farbenfabriken vorm. F. Bayer & Co. Manufacture of solutions of silicic acid and silicate cements, and silicate phosphate cements therefrom. 15,191. June 4.

Frazer, J. K. Gas scrubbing and washing apparatus. 15,266. June 5.

Fujiyama, T. Combustion of pulverised &c., fuels. 14,801. May 31.

Granger, L. Distilling crude mineral oils, volatile hydrocarbons, &c. 15,126. June 3. (France, November 26, 1919.)

Green, A. G. Manufacture of chlorides and anhydrides of organic acids. 15,103. June 3.

Green, W. Process for separating volatile liquid from solution. 14,785. May 31.

Imray, O. (Monsanto Chemical Works). Manufacture of phthaleins. 14,767. May 31.

Lewis, G. P. Purification of oils containing sulphur compounds. 14,868. June 1.

Lewis, W. K. Process for separating volatile liquid from solution. 14,785. May 31.

McKean, J. G., & Jones, R. F. Liquid-fuel furnaces. 15,054. June 3.

Mariller, C. Distilling crude mineral oils, volatile hydrocarbons, &c. 15,126. June 3. (France, November 26, 1919.)

Norsk Hydro-Elektrisk Kvælstofaktieselskab. Process of absorbing nitrous gases. 15,017. June 2.

Quain, J. R. Purification of oils containing sulphur compounds. 14,868. June 1.

Soc. Anon. d'Exploitation de Procédés Evaporatoires, Système Prache et Bouillon. Distilling crude mineral oils, volatile hydrocarbons, &c. 15,126. June 3. (France, November 26, 1919.)

Soc. Chimique des Usines du Rhone, anciennement Gilliard, P Monnet, et Cartier. Fabrication of cellulose esters. 15,104. June 3. (France, June 20, 1919.)

Soc. Process for preparation of twice-substituted 2-4-diketo-tetrahydro-oxazols. 15,280. June 5. (Germany, February 16.)

Swinburne, J. Manufacture of anhydrous chlorides. 15,245. June 5.

Swinburne, J. Cracking hydrocarbon oils. 15,246. June 5.

Traube, W. Process for recovery of ethylene from gaseous mixtures containing it. 15,192. Jun 4. (Germany, July 14, 1919.)

Webb, J. F. Cathodes for electrolysers. 15,286. June 5.

The Japanese Chemical Industry

THE following interesting particulars regarding the Japanese chemical industry have been published by the Board of Trade:

1. Chemicals, the volume of imports of which has vastly increased in the past few years, are salicylic acid, caustic soda, cyanide of soda, soda ash, logwood extract, and aniline dyes.

2. Chemicals which have been in over-supply during 1919 are carbolic acid, soda ash, glue, caustic soda, and rosin.

3. Owing to the difficulty of obtaining supplies from Europe, most of the above have been imported from the United States, while the following have been exclusively imported from there: Bichromate of potash, acetate of calcium, milk sugar, and aniline salt.

The articles that have been imported more freely from Great Britain than from the United States are carbonate of ammonia, tartaric acid, white zinc, cyanide of soda, chloride of ammonia, gelatine, borate of soda, and citric acid.

Peroxide of soda and cyanide of potassium have been exclusively imported from Great Britain.

The following articles have been converted into export lines during the war:—Naphthaline, acetic acid, calcium, zinc dust, and copper sulphate, as have also several potash compounds, such as chlorate of potash and chloride of potassium.

Exchange of Dyeware Secrets

SENATOR J. O. WOLCOTT on Friday, June 4, defended in the Senate the "business agreement" between the Du Pont de Nemours Co. and Levinstein, Ltd., both of which concerns are manufacturers of dyestuffs, for the interchange of trade secrets. Mr. Wolcott said the arrangements entered into by the Du Pont de Nemours Co. would give the American consumer all the advantages secured to the British consumer through the seizure of German plant.

SIR W. J. POPE, F.R.S., was elected, on June 5, an associate of the Section for the Mathematical and Physical Sciences of the Academié Royale de Belgique.

Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, *and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co. and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The weekly report contains only commodities whose values are at the time of particular interest or of a fluctuating nature. A more complete report and list are published once a month. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report.*

Market Report

THURSDAY, June 10.

The volume of business passing has shown considerable expansion this week and with few exceptions the market is steady and prices show little fluctuations.

The manufacturers are not eager sellers as they are heavily committed and in many cases behind with deliveries. The export demand is fully maintained, and all things considered the position cannot be regarded unsatisfactory.

General Chemicals

ACETONE is in good demand and steady business is passing. Export enquiry is particularly brisk.

ACID ACETIC exhibits a firmer tone and available supplies are rapidly snapped up.

ACID CARBOLIC is quiet and inclined to be slightly easier in price.

ACID CITRIC remains a drooping market, but with the absorption of second-hand supplies an improvement is not unlikely.

ACID FORMIC is quiet and steady in tone.

ACID OXALIC is in better demand and the price is fully maintained.

ACID TARTARIC.—Only a small business is passing without change in value.

AMMONIUM SALTS are not quite so tight but prices are maintained.

ARSENIC is a quiet and steady market at recent figures.

BARIUM SALTS are moving off well and are without change in price.

BLEACHING POWDER is as scarce as ever and the market is practically restricted with small second-hand lots.

CALCIUM ACETATE is particularly firm in tone and large supplies are inadequate.

COPPER SULPHATE shows no improvement and is practically lifeless.

CREAM OF TARTAR is inclined to be slightly easier.

FORMALDEHYDE exhibits a firmer tone and spot supplies are remarkably scarce.

LEAD SALTS are slightly easier, but an improvement in demand would probably demonstrate a paucity of supplies.

LITHOPONE is in good request and price is well maintained.

MAGNESIUM SALTS have been in enquiry for export, values unchanged.

POTASSIUM CARBONATE is sharply advancing in price and a further improvement is looked for.

POTASSIUM PERMANGANATE has been in good request and only small quantities are available for immediate delivery.

POTASSIUM PRUSSIATE is in better demand, particularly for early delivery, the tendency if anything is firmer.

SODIUM ACETATE is quietly steady at recent figures.

SODIUM BICHROMATE is as scarce as ever and there is eager competition for second-hand parcels.

SODA CAUSTIC has been a rather quieter market but there is no tendency for cut prices.

SODIUM HYPOSULPHITE remains a nominal market, supplies for near delivery are practically unobtainable.

SODIUM NITRITE.—Recent arrivals have satisfied immediate demand and there is little doing in the article.

SODA PHOSPHATE is very scarce for spot delivery, makers are well sold ahead and second-hand parcels are commanding a premium.

SODIUM SULPHIDE.—The market is still controlled by second-hand parcels which are few and far between, and for which extortionate prices are demanded.

TIN SALTS are easy and uninteresting market.

ZINC SALTS are still on the quiet side without change in price.

Coal Tar Intermediates

There is still a strong demand for intermediates, and prices continue firm, with a tendency in some cases to advance.

ALPHA NAPHTHOL.—Manufacturers are booked ahead, and are disinclined to accept future business.

ALPHA NAPHTHYLAMINE.—The position is unchanged.

ANILINE OIL AND SALT.—Are both in good demand, and the price of Oil is likely to advance shortly.

A few export licences for Aniline Salt appear to have been granted lately.

BETA NAPHTHOL.—Continues to be very scarce, and it is extremely difficult to obtain any parcels for near delivery.

DIMETHYLANILINE is in request, but nothing is obtainable.

DIPHENYLAMINE is in short supply and the price is very firm.

PARANITRANILINE is very firm, and there is very little offered for early delivery. Spot parcels are eagerly sought for at fancy prices.

XYLIDINE.—There is no change to report.

Coal Tar Products

There is very little change in our market since last week.

90's BENZOL is stiffening slightly and is worth about 2s. 11d. on rails.

PURE BENZOL is still scarce at about 3s. 4d. per gallon.

CREOSOTE OIL remains steady at 1s. to 1s. 1d. in the North, and 1s. 1d. to 1s. 2d. in the South.

SOLVENT NAPHTHA 90/160 is slightly firmer at a price of about 2s. 11d. on rails.

HEAVY NAPHTHA is in good demand at 3s. 6d. per gallon.

NAPHTHALENE.—Supplies of naphthalene, particularly the crude qualities, are rather freer. Crude is worth about £14 to £18 per ton and refined from £36 to £40.

PITCH.—Business is very quiet as the season is now at an end. Forward delivery: business has been done at 165s. to 170s. f.o.b. East Coast, and London is quoted at 175s. f.o.b.

Sulphate of Ammonia

The demand for Home consumption is fairly strong, notwithstanding the new prices which came into force on the 1st of this month. The price for June/July delivery is £23 10s. per ton.

Current Prices

Chemicals

	per	£	s	d.		£	s.	d.
Acetic anhydride	lb.	0	3	6	to	0	3	9
Acetone oil	ton	90	0	0	to	95	0	0
Acetone, pure	ton	120	0	0	to	125	0	0
Acid, Acetic, glacial, 99-100%	ton	120	0	0	to	122	10	0
Acetic, 80% pure	ton	97	0	0	to	98	10	0
Arsenic	ton	100	0	0	to	105	0	0
Boric, cryst.	ton	74	10	0	to	76	0	0
Carbolic, cryst. 39-40%	lb.	0	1	3	to	0	1	3½
Citric	lb.	0	5	9	to	0	6	0
Formic, 80%	ton	120	0	0	to	—		
Gallic, pure	lb.		8	6	to	0	8	9
Hydrofluoric	lb.	0	0	7	to	0	0	8
Lactic, 50 vol.	ton	62	0	0	to	63	0	0
Lactic, 60 vol.	ton	75	0	0	to	77	10	0
Nitric, 80 Tw.	ton	41	0	0	to	44	0	0
Oxalic	lb.	0	2	11	to	0	3	0
Phosphoric, 1.5	ton	65	0	0	to	67	0	0
Pyrogallic, cryst	lb.	0	11	6	to	0	11	9
Salicylic, Technical	lb.	0	2	10	to	0	3	6
Salicylic, B.P.	lb.	0	3	8	to	0	3	10
Sulphuric, 92-93%	ton	8	0	0	to	8	10	0
Tannic, commercial	lb.	0	5	0	to	0	5	3
Tartaric	lb.	0	4	0	to	0	4	2
Alum, lump	ton	19	10	0	to	20	0	0
Alum, chrome	ton	93	0	0	to	95	0	0
Alumino ferric	ton	9	0	0	to	9	10	0
Aluminium, sulphate, 14-15%	ton	17	10	0	to	18	10	0
Aluminium, sulphate, 17-18%	ton	20	10	0	to	21	10	0

	per	£	s.	d.		£	s.	d.
Ammonia, anhydrous	lb.	0	2	2	to	0	2	4
Ammonia, .880	ton	52	0	0	to	57	0	0
Ammonia, .920	ton	42	0	0	to	46	0	0
Ammonia, carbonate	lb.	0	0	7½	to		—	
Ammonia, chloride	ton	115	0	0	to	120	0	0
Ammonia, muriate (galvanisers)	ton	60	0	0	to	65	0	0
Ammonia, nitrate	ton	60	0	0	to	65	0	0
Ammonia, phosphate	ton	130	0	0	to	135	0	0
Ammonia, sulphocyanide	lb.	0	2	3	to	0	2	6
Amyl, acetate	ton	360	0	0	to	370	0	0
Arsenic, white, powdered	ton	67	10	0	to	70	0	0
Barium, carbonate	ton	13	10	0	to	14	10	0
Carbonate, 92-94%	ton	14	10	0	to	15	0	0
Barium, chlorate	lb.	0	1	4	to	0	1	5
Chloride	ton	36	0	0	to	37	0	0
Barium, Nitrate	ton	55	0	0	to	56	0	0
Sulphate, blanc fixe, dry	ton	25	10	0	to	26	0	0
Sulphate, blanc fixe, pulp	ton	15	10	0	to	16	0	0
Bleaching powder, 35-37%	ton	18	10	0	to	19	10	0
Borax crystals	ton	41	0	0	to	42	10	0
Calcium acetate, Brown	ton	20	0	0	to	21	0	0
,, Grey	ton	35	0	0	to	37	10	0
Calcium Carbide	ton	30	0	0	to	32	0	0
Chloride	ton	9	10	0	to	10	10	0
Carbon bisulphide	ton	58	0	0	to	59	0	0
Casein, technical	ton	80	0	0	to	83	0	0
Cerium oxalate	lb.	0	3	9	to	0	4	0
Chromium acetate	lb.	0	1	2	to	0	1	4
Cobalt acetate	lb.	0	7	3	to	0	7	6
Oxide, black	lb.	0	7	9	to	0	8	0
Copper chloride	lb.	0	1	3	to	0	1	6
Sulphate	ton	45	0	0	to	46	0	0
Cream Tartar, 98-100%	ton	295	0	0	to	300	0	0
Epsom salts (*see* Magnesium sulphate)								
Formaldehyde 40% vol	ton	345	0	0	to	350	0	0
Formusol (Rongalite)	lb.	0	4	0	to	0	4	3
Glauber salts	ton	Nominal.						
Glycerine, crude	ton	70	0	0	to	72	10	0
Hydrogen peroxide, 12 vols.	gal.	0	2	8	to	0	2	9
Iron perchloride	ton	50	0	0	to	52	0	0
Iron sulphate (Copperas)	ton	4	15	0	to	5	0	0
Lead acetate, white	ton	90	0	0	to	92	10	0
Carbonate (White Lead)	ton	70	0	0	to	72	10	0
Nitrate	ton	72	0	0	to	75	0	0
Litharge	ton	62	10	0	to	65	0	0
Lithopone, 30%	ton	59	0	0	to	61	0	0
Magnesium chloride	ton	15	10	0	to	16	10	0
Carbonate, light	cwt	2	15	0	to	3	0	0
Sulphate (Epsom salts commercial)	ton	14	0	0	to	14	10	0
Sulphate (Druggists')	ton	18	10	0	to	19	10	0
Manganese, Borate	ton	190	0	0	to		—	
Sulphate	ton	105	0	0	to	110	0	0
Methyl acetone	ton	95	0	0	to	100	0	0
Alcohol, 1% acetone	gall.	Nominal.						
Nickel ammonium sulphate, single salt	ton	50	0	0	to	52	10	0
Potassium bichromate	lb.	0	2	2	to	0	2	3
Potassium Carbonate, 90%	ton	115	0	0	to	120	0	0
Chloride	ton	Nominal.						
Chlorate	lb.	0	0	10	to	0	0	10½
Meta-bisulphite, 50-52%	ton	270	0	0	to	280	0	0
Nitrate, refined	ton	70	0	0	to	72	0	0
Permanganate	lb.	0	5	9	to	0	6	0
Prussiate, red	lb.	0	6	0	to	0	6	3
Prussiate, yellow	lb.	0	2	3	to	0	2	4
Sulphate, 90%	ton	31	0	0	to	33	0	0
Salammoniac, firsts	cwt.	5	15	0	to		—	
Seconds	cwt.	6	0	0	to		—	
Sodium acetate	ton	61	0	0	to	63	0	0
Arsenate, 45%	ton	60	0	0	to	62	0	0
Bicarbonate	ton	10	10	0	to	11	0	0
Bichromate	lb.	0	1	11	to	0	2	0
Bisulphite, 60-62%	ton	50	0	0	to	52	10	0
Chlorate	lb.	0	0	5½	to	0	0	6½
Caustic, 70%	ton	43	10	0	to	44	10	0
Caustic, 76%	ton	44	10	0	to	45	10	0
Hydrosulphite, powder, 85%	lb.	0	4	0	to	0	5	0
Hyposulphite, commercial	ton	37	10	0	to	40	0	0
Nitrite, 96-98%	ton	120	0	0	to	125	0	0
Phosphate, crystal	ton	39	0	0	to	41	0	0
Perborate	lb.	0	2	2	to	0	2	4
Prussiate	lb.	0	1	9	to	0	1	9½
Sulphide, crystals	ton	30	0	0	to	32	0	0
Sulphide, solid, 60-62%	ton	62	10	0	to	65	0	0
Sulphite, cryst.	ton	15	10	0	to	16	10	0
Strontium carbonate	ton	85	0	0	to	90	0	0
Nitrate	ton	90	0	0	to	95	0	0
Sulphate, white	ton	8	10	0	to	10	0	0

	per	£	s.	d.		£	s.	d.
Sulphur chloride	ton	42	0	0	to	44	10	0
Sulphur, Flowers	ton	24	0	0	to	26	0	0
Roll	ton	24	0	0	to	26	0	0
Tartar emetic	lb.	0	3	5	to	0	3	6
Tin perchloride, 33%	lb.	0	2	6	to	0	2	7
Perchloride, solid	lb.	0	3	0	to	0	3	3
Protochloride (tin crystals)	lb	0	2	0	to	0	2	1
Zinc chloride, 102 Tw.	ton	22	0	0	to	23	10	0
Chloride, solid, 96-98%	ton	60	0	0	to	65	0	0
Oxide, 99%	ton	82	10	0	to	85	0	0
Oxide, 94-95%	ton	70	0	0	to	72	10	0
Dust, 90%	ton	90	0	0	to	92	10	0
Sulphate	ton	21	10	0	to	23	10	0

Coal Tar Intermediates, &c.

	per	£	s.	d.		£	s.	d.
Alphanaphthol, crude	lb.	0	4	0	to	0	4	3
Alphanaphthol, refined	lb.	0	5	0	to	0	5	3
Alphanaphthylamine	lb.	0	4	0	to	0	4	3
Aniline oil, drums extra	lb.	0	1	8	to	0	1	9
Aniline salts	lb.	0	1	10	to	0	2	0
Anthracene, 85-90%	lb.		—		to		—	
Benzaldehyde (free of chlorine)	lb.	0	5	6	to	0	6	0
Benzidine, base	lb.	0	12	6	to	0	13	6
Benzidine, sulphate	lb.	0	10	0	to	0	11	0
Benzoic, acid	lb.	0	5	6	to	0	6	0
Benzoate of soda	lb.	0	5	6	to	0	6	0
Benzyl chloride, technical	lb.	0	2	0	to	0	2	3
Betanaphthol benzoate	lb.	1	6	0	to	1	7	6
Betanaphthol	lb.	0	5	3	to	0	5	6
Betanaphthylamine, technical	lb.	0	8	6	to	0	9	6
Croceine Acid, 100% basis	lb	0	5	0	to	0	6	3
Dichlorbenzol	lb.	0	0	6	to	0	0	7
Diethylaniline	lb.	0	7	9	to	0	8	6
Dinitrobenzol	lb.	0	1	5	to	0	1	6
Dinitrochlorbenzol	lb.	0	1	5	to	0	1	6
Dinitronaphthaline	lb.	0	1	4	to	0	1	6
Dinitrotoluol	lb.	0	1	8	to	0	1	9
Dinitrophenol	lb.	0	2	3	to	0	2	6
Dimethylaniline	lb.	0	5	0	to	0	5	6
Diphenylamine	lb.	0	5	0	to	0	5	3
H-Acid	lb.	0	14	6	to	0	15	0
Metaphenylenediamine	lb.	0	5	9	to	0	6	0
Monochlorbenzol	lb.	0	0	10	to	0	1	0
Metanilic Acid	lb.	0	7	6	to	0	8	6
Monosulphonic Acid (2:7)	lb.	0	7	6	to	0	8	0
Naphthionic acid, crude	lb.	0	5	6	to	0	6	0
Naphthionate of Soda	lb.	0	6	0	to	0	6	6
Naphthylamin-di-sulphonic-acid	lb.	0	5	6	to	0	6	6
Nitronaphthaline	lb.	0	1	3	to	0	1	4
Nitrotoluol	lb.	0	1	4	to	0	1	6
Orthoamidophenol, base	lb.	0	18	0	to	1	0	0
Orthodichlorbenzol	lb.	0	1	2	to	0	1	4
Orthotoluidine	lb.	0	2	6	to	0	2	9
Orthonitrotoluol	lb.	0	1	7	to	0	1	8
Para-amidophenol, base	lb.	0	15	0	to	0	16	0
Para-amidophenol, hydrochlor	lb	0	15	6	to	0	16	0
Paradichlorbenzol	lb.	0	0	6	to	0	0	8
Paranitraniline	lb.	0	8	3	to	0	8	9
Paranitrophenol	lb.	0	2	6	to	0	2	9
Paranitrotoluol	lb.	0	5	3	to	0	5	6
Paraphenylenediamine, distilled	lb.	0	13	6	to	0	14	6
Paratoluidine	lb.	0	7	6	to	0	8	6
Phthalic anhydride	lb.	0	5	6	to	0	6	0
R. Salt, 100% basis	lb.	0	4	0	to	0	4	2
Resorcin, technical	lb.	0	11	6	to	0	12	6
Resorcin, pure	lb.	0	17	6	to	1	0	0
Salol	lb.	0	5	9	to	0	6	0
Shaeffer acid, 100% basis	lb.	0	3	6	to	0	3	0
Sulphanilic acid, crude	lb.	0	1	5	to	0	1	6
Tolidine, base	lb.	0	10	6	to	0	11	6
Tolidine, mixture	lb.	0	3	0	to	0	3	6

Export Licences for Coal Tar Products

MR. BRIDGEMAN, in reply to Mr. Kiley (House of Commons, June 8), stated that applicants for export licenses for certain coal-tar products were required to produce a certificate from the actual manufacturers to the effect that they could supply the quantity of goods in question for export without detriment to their deliveries to domestic consumers. It was obviously in the interests of the export trade generally that the requirements of the users of these commodities in the United Kingdom should be supplied so far as practicable.

Company News

PREMIER OIL.—A meeting will be held at Winchester House, on June 17, at 11 o'clock, to consider a provisional agreement with the Société Financière des Petroles.

BLEACHERS' ASSOCIATION.—The annual report shows £1,202,240 trading profit, plus £288,888 brought forward. The ordinary dividend for the year is 15 per cent., plus 5 per cent. bonus; £150,465 forward.

DAY & MARTIN.—At the annual meeting at Stratford, E., Mr. C. H. Watkins (chairman of the company) presiding, the report and accounts were unanimously adopted, and a dividend at the rate of 6 per cent. per annum was declared on the preferred ordinary shares, payable on June 4.

TRINIDAD CENTRAL OILFIELDS.—The report for 1919 states that the net profit, after providing £10,788 for depreciation, is £43,012, as against £11,949 for 1918. The balance standing to the credit of revenue account is £52,821. A dividend of 10 per cent. upon the 350,000 fully paid shares for the year 1919 is recommended, leaving £17,821 to be carried forward.

DOMINION STEEL.—The directors have declared a dividend at the rate of 1½ per cent. on the common shares, payable on July 1 to holders of record on June 5. Holders of share warrants to bearer are notified that Coupon No. 25 will be paid, on and after July 1, on presentation at the Bank of Montreal, London, or in Montreal.

SHIP CANAL PORTLAND CEMENT MANUFACTURERS.—The directors state that the accounts to March 31 last have been made up, and will be forwarded to shareholders in the course of a few weeks, together with the report. They have resolved to begin to pay off the arrears of the preference dividends and warrants for the half-year to December 1, 1915, have been posted.

BRYANT & MAY.—Subscriptions are invited at par for £300,000 seven-and-a-half per cent. five-year notes, forming the first part of an issue of £600,000, repayable at 102 on July 1, 1925. The company may redeem the notes by purchase at any time or by drawings at 102 after July 1, 1922, on three months' notice. A full half-year's interest is payable on January 1, 1921.

YORKSHIRE DYEWARE & CHEMICAL.—The report for nine months ended March 31 states that after providing for depreciation, &c., there is a surplus of £48,218, which, added to the balance brought forward, makes £56,919. Dividend, including interim, 20 per cent. per annum for the nine months, less tax. After placing £30,000 to reserve and extensions £8,476 is carried forward.

EAGLE OIL TRANSPORT.—Referring to the accounts at the ninth general meeting in London on Monday, Mr. B. C. Pearson, who presided, stated that the net profit for the year, before adding the balance brought forward, amounted to £323,591, and after deducting the transfer of £113,231 to depreciation reserve, there remained a balance of some £210,000, which compared with £177,000 was an increase of some £33,000. The board recommended the payment of a further 2 per cent. on the preference shares, making 8 per cent. for the year, and also 8 per cent. on the ordinary shares.

ZINC CORPORATION.—The report for 1919 states that in consequence of the strike at Broken Hill, the mine and works have been closed down since May 6, 1919. Productive operations were restricted, therefore, to the first four months of the year, and the profits shown are due mainly to sums received during the remaining period from the realisation of the metal contracts of the concentrates produced prior to the shut-down. The net profit for the year amounted to £77,377, against £226,470 in 1918.. The board regret that the position does not justify the recommendation of the payment of a participating dividend in respect of the year 1919.

LINGGI PLANTATIONS.—Mr. Noel Trotter (chairman), who presided at the twenty-fourth annual meeting in London on Thursday, June 3, said that the crop harvested in 1919 amounted to 2,804,960 lb., being over 1,000,000 lb. more than in the previous year. This was a record crop for the company, and he believed it had only once been exceeded by any other rubber producing company. The profit for the year amounted to £123,607 9s. 5d., as compared with £40,603 17s. 9d. A final dividend of 20 per cent. was recommended, which, with the interim dividend of 5 per cent. paid last November, made a total distribution for the year of 25 per cent. on the ordinary shares. Bearing in mind that the ordinary capital issued was four times what it was in 1918, the distribution was equivalent to 100 per cent. on the previous capital, and was actually double the sum paid for 1918.

GEL TIN, LODE, AND ALLUVIAL.—The directors of the Gel Tin, Lode, and Alluvial Company submit their balance sheet as at December 31 last, incorporating the receipts and expenditure for the two years to that date. The company's investments show an appreciation over cost of £968. From time to time the directors have investigated various mining proposals submitted for development by the company. They now report that after very protracted negotiations they have secured the working option of a mineral lease of an extensive property in Carnarvonshire, North Wales, called "Coed Mawr," which offers good prospects of profitable operation.

"SANITAS."—At the annual meeting of the Sanitas Co., Ltd., held in London on Thursday, June 3, Mr. C. T. Kingzett, who presided, stated that several promising developments were under the consideration of the board. The balance to the credit of profit and loss account, including the amount brought forward from the last account, amounted to £39,012 5s. 9d., and after payment of the dividend on the 9 per cent. cumulative preference shares and provision for income-tax, there was an available balance from which it was proposed to pay a dividend of 10 per cent., free of income-tax, on the ordinary shares of the company for the year ended March 31, 1920, leaving a balance of £2,811 11s. 7d. to be carried to next account.

EBBW VALE STEEL, IRON & COAL.—The accounts as at March 31, 1920, show a credit balance of £13,220 brought in from the year ended March 31, 1917, and gross profits to March 31, 1920 (after providing for all liabilities), £1,448,632, together £1,461,853. Of this sum, general and legal expenses absorbed £42,390, interest on debentures and loans £191,815, expenditure on new works £39,727, and war allowances £52,118, leaving £1,135,801 available for distribution. A final dividend on preference shares (£88,000), an interim on the ordinary shares (£435,000), in each case for the two years to March 31, 1919, and an interim dividend on the preference shares for the half-year to September 30, 1919, have been paid, leaving £570,801. The directors propose a final dividend on the preference shares, making 7 per cent. for the year, and a dividend on the ordinary at the rate of 15 per cent., placing £250,000 to reserve; carrying forward £16,301.

TANKERS, LTD.—At the statutory meeting in London last week, the chairman, Mr. T. J. Callaghan, said that for the 1,500,000 8 per cent. participating preference (exchangeable) shares of £1 each issued in February last applications had been received for upwards of 5,000,000 shares. In accordance with the terms of the prospectus, the Scottish-American Oil & Transport Company had subscribed for 1,500,000 ordinary shares of £1 each, upon which they had paid in cash 10s. per share (£750,000). The remaining 10s. per share would be forthcoming as and when required. Negotiations had just been concluded resulting, subject to certain conditions, in the acquisition by the Anglo-Persian Oil Company of a considerable block of vendor shares in the Scottish-American Oil & Transport Company. The conditions were to be discussed that afternoon by the board, and the arrangements made with the Anglo-Persian Company would be immediately conveyed to the shareholders.

THE GRAPHITE OILS CO., LTD.—This company, with a share capital of £200,000 £1 shares, are offering for subscription this week 150,000 shares at par the proceeds of which will provide £100,000 for working capital, less the expenses of the issue. The remaining 50,000 are issued as fully paid in part payment of the purchase consideration. The company has been formed to acquire as from January 1, 1920, the whole of the assets, contracts, and business (other than undivided profits) of the Graphite Oils Co., Ltd., of Glasgow, and to work and develop the same, especially the process for the manufacture of lubricating oils and greases with natural graphite in suspension. The vendor company, it is stated, was established in 1913 to test and develop the discovery of a method for the manufacture of all classes of lubricating oils and greases with natural graphite in suspension therein, and have developed the process to a highly successful point and placed the same on the market with most gratifying results. The oils and greases are sold under the registered trade mark "Suspensol."

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

London Gazette

Partnerships Dissolved

EVANS, JOHN & STEVENSON, JAMES THOMAS, analytical and consulting chemists, 67 and 69, Surrey Street, Sheffield, under the style of A. H. Allen & Partners, by mutual consent as from September 30, 1919. All debts received or paid by John Evans, who will carry on the business.

SMITH, JOSEPH DE CARLE & SMITH, RICHARD SILCOCK, wholesale druggists and manufacturing chemists, Magdalen Street, Norwich, under the style of Smith & Sons, by mutual consent, as and from December 31, 1919, All debts received and paid by Joseph de Carle Smith, who will continue the business under the present style.

WATTS, ALBERT GEORGE, WOLSEY, WALTER ERNEST & PUDDIFOOT, WILLIAM THOMAS, perfumers and toilet specialists, 122, Petherton Road, Clissold Park, London, N., under the style of the Parkside Manufacturing Company, by mutual consent, as and from May 17, 1920. All debts received and paid by A. G. Watts & W. T. Puddifoot.

Notice of Dividend

THE ANGLO-CUBAN OIL BITUMEN AND ASPHALT CO., LTD., 513, Salisbury House, London, 2s. $6\frac{1}{20}$d., first and final. Any day (except Saturday) between 11 and 2 at the office of the Official Receiver and Liquidator, 33, Carey Street, Lincoln's Inn, London, W.C. 2.

Liquidator's Notice

FULLERS CARBON & ELECTRICAL CO., LTD. (In liquidation).—A final meeting of members will be held at the offices of J. Dix Lewis, Caesar & Co., Kennan's House, Crown Court, Cheapside, E.C. 2, on Wednesday, July 7, at 3 p.m. H. M. Morris, Liquidator.

Companies Winding Up Voluntarily

BELL GRAPHITE CO., LTD.—A meeting of creditors will be held at 4, Coleman Street, London, on Thursday, June 17, at 12 noon. E. Tappenden, Liquidator.

WESTERN OIL SYNDICATE, LTD. (In voluntary liquidation).—A general meeting of members will be held at 36, King Street, Cheapside, London, E.C., on Wednesday, July 14, at 4.30 p.m. E. C. Nicholls and J. F. W. Lennard, Liquidators.

ANGLO-CONTINENTAL CHEMICAL WORKS, LTD.—Liquidator, J. Sperni, 362, Gray's Inn, London, W.C.

JAPANESE EXPLOSIVES CO., LTD.—A meeting of creditors will be held at 38-39, Parliament Street, London, S.W. 1, on Tuesday, June 22, at 3 p.m. S. McA. Walker, Liquidator.

VIKING OILFIELDS CO., LTD., Liquidator, H. Thomas, 170, Winchester House, London.

Mortgages and Charges

*[NOTE.—The Companies Consolidation Act, of 1908, provides that every Mortgage or Charge, as described therein, created after July 1, 1908, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges which would, if created after July 1, 1908, require registration. The following Mortgages and Charges have been so registered. In each case the total debt, as specified, in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced since such date.]*

Satisfactions

CITY GLASS BOTTLE CO., LTD., CANNING TOWN, E.—Satisfactions registered June 1, £3,000, registered July 3, 1907, and £5,000, registered September 1, 1911.

TOLHORST'S CEMENT WORKS, LTD., LONDON, E.C.—Satisfaction registered May 27, for £60,000, part of £120,000 registered January 15, 1912.

New Companies Registered

The following have been prepared for us by Jordan & Sons, Ltd., company registration agents, 116 and 117, Chancery Lane, London, W.C. :—

WALLER (H.) GORDON & CO., LTD., 29, Friar Lane, Leicester.—Rubber solution manufacturers and oil and grease importers. Nominal capital, £5,000 in 5,000 shares of £1 each. Directors: H. Goodliff, 4, Sheep Street, Northampton; H. G. Waller, 45, Upperton Road, Leicester; T. N. Watson, 1, Portland Road, Leicester. Qualification of directors, £250.

WASTE FUEL RECOVERY BRIQUETTE CO., LTD., 20, Market Street, Curzon Street, Mayfair, W.—Manufacturers and dealers in briquettes and patent fuels. Nominal capital, £50,000 in 47,500 preference shares of £1 each, and 50,000 ordinary shares of 1s. each. Minimum subscription, 100 shares. Directors: W. F. Hill, Southmead, Newbury, Berks; B. de VicCarey, 20, Market Street, Curzon Street, Mayfair. Qualification of directors, 100 shares. Remuneration of directors, £50 each.